HAZARDOUS WASTE AND THE STRINGFELLOW ACID PITS

HEARING

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

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HAZARDOUS WASTE AND THE STRINGFELLOW ACID PITS

FRIDAY, APRIL 22, 1983

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH AND ENVIRONMENT,
Glen Avon, CA.

The subcommittee hearing convened, pursuant to notice, at 2 p.m., at the Jurupa Junior High School, Glen Avon, CA, Hon. George Brown, chairman, presiding and Hon. Alfred A. McCandless present.

Mr. BROWN. If we may have the cooperation of the audience, we will begin this hearing. This is a joint hearing of a congressional subcommittee, the Subcommittee on Natural Resources, Agriculture Research and Environment of the Committee on Science and Technology of the House of Representatives and the California State Assembly Committee on Consumer Protection and Toxic Materials, chaired by Sally Tanner, who is seated at my right.

This is a rather unusual event and the subject of this hearing has obviously elicited a very substantial amount of public and media interest. So, in order to accomplish our goals, it will be necessary that we exercise a small amount of discipline this afternoon, which I hope we will be able to do.

I have an opening statement, which I will make just shortly and that will be followed by an opening statement from Sally Tanner on behalf of the State legislature and then we will proceed with four panels of witnesses, whom I will introduce at the time that they appear.

I would also like to introduce the other elected officials who are with us this afternoon and we are very pleased to see such an excellent turnout. In addition to Sally, who will make an opening statement very shortly, I would like to introduce on her right, Tom Hayden, a member of Sally's subcommittee. On my left—we will see if we can get the PA system corrected so that everyone can hear. I will shout a little bit louder and you will be a little bit quieter maybe.

On my left is Senator Presley, who is the Senator for Riverside County. We are very pleased to have him with us today. Next to him is Assemblyman Goggin, who represents the adjoining area in San Bernardino County and Assemblyman Steve Clute. Assemblyman Clute represents this part of Riverside County. We are very pleased to have them.

Congressman McCandless is expected to be here shortly. Congressman McCandless represents the other portion of Riverside County that I don't represent. Earlier this morning for the tour of the site, we had Congressman James Sensenbrenner of Wisconsin, who unfortunately had to leave a little earlier.

If I may, I will go through my prepared statement very quickly here. I would like to welcome all of you to this hearing, which I am pleased to conduct jointly with Sally Tanner of the California State Assembly. I am particularly pleased that State Senator Bob Presley, who is the father of the State's superfund law, has also joined us this afternoon.

I would also like to express my appreciation for the very large turnout that we have. We have convened this hearing in this community because it is important to involve the public in critical decisions that affect us all. While this is not, and should not be, the only way the public can get involved in the political process, it is a very important part of being involved. Just by being here today, you are registering your concern with the subject of this hearing, which is the cleanup of the Stringfellow acid pits.

In addition to representatives from Federal and State agencies, we will be hearing the views of local citizens, as well as professionals involved locally with the Stringfellow site. While everyone who would like to express their views will not be able to do so today, we have tried to select witnesses that cover a broad range of views and we have tried to be particularly sensitive to the views of this community. And I might say that for those of you who have a contribution that you would like to make to the committee and wish to submit it in writing, it will be made a part of the committee record. But, obviously, we do not have the time this afternoon to hear from everyone in the audience.

While we are examining the details of the cleanup requirements and health hazards of the Stringfellow site, we are also looking at what we would call the big picture. Like it or not, the Stringfellow site has received national attention because it is one example of thousands of abandoned hazardous waste sites across the country. It happens to be a particularly difficult and expensive site to deal with, but it is not that different from other sites eligible for Federal funding under the Superfund program, a program which was designed to fund the clean up of abandoned hazardous waste sites.

The committee seeks information that will lead to appropriate research for the development of hazardous waste treatment technologies, adequate monitoring technologies, and meaningful health studies or epidemiological studies necessary to protect the health of all the citizens of this community and of the country.

Research in all three of these areas has been inadequate to complete the task at hand. We are discovering more and more dump sites every day and the problems at those sites seem to be multiplying. I hope we can shed some light on these issues today and prompt action will be taken where action is needed.

This hearing will focus on the performance of the Superfund law as it relates to Stringfellow. The community of Glen Avon has struggled valiantly to get this site cleaned up to its satisfaction. Today, we would like to examine how well we have done on that.

We have many witnesses and many other people in attendance today and I would like to stress the need for keeping all of our remarks brief and to the point. I would like to assure all of the members of the committees represented here, as well as witnesses, that their written remarks will be included as part of the official record that will be available on request.

I would also like to pay tribute to Supervisor Melba Dunlap who is present here. Would you stand up, Melba? Melba, of course, has been extremely active in making sure that all necessary actions or possible actions were taken in this cleanup. I would now like to recognize Sally Tanner for any opening remarks she would like to make.

STATEMENT OF SALLY TANNER, CHAIRWOMAN, STATE ASSEMBLY COMMITTEE ON CONSUMER PROTECTION AND TOXIC CHEMICALS

Ms. TANNER. Thank you, George.

I am pleased to welcome you on behalf of the California State Legislature to this special joint hearing to examine hazardous waste cleanup activities under the State and Federal Superfund programs.

I am gratified that we have been successful in arranging this meeting because the events of the past several months have dramatically demonstrated the need for the legislature and Congress to investigate what has gone wrong with the superfund program and what can now be done to restore public confidence in government's ability to protect them from the dangers of hazardous waste.

I believe that it is especially important that the Congress and the legislature work closely together in conducting oversight of these important programs because State and Federal responsibilities for hazardous waste cleanup are closely linked.

California was one of the first States to enact its own superfund law and we had hoped that our readiness to match Federal Superfund moneys would ensure quick action to clean up California's many dangerous dumpsites. We have, needless to say, been deeply disappointed at the extent of bureaucratic foot dragging and endless delay, which has characterized the administration of Superfund by EPA.

While California's own State bureaucracy continues to frustrate many of us in the legislature, we cannot solve the very real public health problems posed by hazardous waste through State level reforms only. Because our funds are so limited and our waste problems so great, we are dependent on a sustained financial commitment from the Federal Government, not to mention the need for Federal support for scientific and applied research to develop new and safer technologies to dispose of hazardous waste.

While the Reagan administration's cost in EPA's research and enforcement budgets have clearly damaged hazardous waste management efforts, what has been most disturbing from California's perspective is the continuing failure of EPA to effectively utilize the $1.6 billion made available by Congress for the cleanup of haz-

ardous waste sites. The excuses have varied, but the facts are inescapable. The job Congress demanded has not been done.

We are also concerned with the approach which has been taken with regard to public participation in the policy decisions governing cleanup activities. As we saw vividly this morning, the interim solutions which have been attempted at Stringfellow have failed to protect public health. While some of the past mistakes are clearly due to the learning curve of this difficult site, the longstanding concerns of local residents with the proposed solutions have not been borne out. The least cost approach, which appears to have been EPA policy, has been discredited. More importantly, the failure to listen and to work with the people most affected by these decisions has nearly destroyed the public's confidence that their health and their communities will be protected.

Finally, despite the failure and frustrations of the past, we must join in an effort to recover the momentum we have lost and redouble our efforts to make these programs work the way they were intended. At the same time, we must also find new ways to encourage the rapid development of new waste disposal treatment technologies so that we can significantly reduce the environmental and health risks of hazardous waste disposal.

The challenges we face are enormous, but the public expects nothing less than an all out commitment to their ultimate solution and this is what we intend and pledge to do.

[The prepared statement of Ms. Tanner follows:]

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SALLY TANNER

April 22, 1983
Glen Avon, Californ.

OPENING STATEMENT FOR

JOINT HEARING BY ASSEMBLY COMMITTEE ON CONSUMER PROTECTION AND TOXIC MATERIALS AND HOUSE SCIENCE AND TECHNOLOGY SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE, RESEARCH, AND ENVIRONMENT ON MANAGEMENT OF THE STATE AND FEDERAL "SUPERFUND" PROGRAM

I AM PLEASED TO WELCOME YOU ON BEHALF OF THE CALIFORNIA STATE LEGISLATURE TO THIS SPECIAL JOINT HEARING TO EXAMINE HAZARDOUS WASTE CLEAN UP ACTIVITIES UNDER THE STATE AND FEDERAL SUPERFUND PROGRAM.

I AM GRATIFIED THAT WE HAVE BEEN SUCCESSFUL IN ARRANGING THIS MEETING BECAUSE THE EVENTS OF THE PAST SEVERAL MONTHS HAVE DRAMATICALLY DEMONSTRATED THE NEED FOR THE LEGISLATURE AND CONGRESS TO INVESTIGATE WHAT HAS GONE WRONG WITH THE SUPERFUND PROGRAM AND WHAT CAN NOW BE DONE TO RESTORE PUBLIC CONFIDENCE IN GOVERNMENT'S ABILITY TO PROTECT THEM FROM THE DANGERS OF HAZARDOUS WASTE.

I BELIEVE IT IS ESPECIALLY IMPORTANT THAT THE CONGRESS AND THE LEGISLATURE WORK CLOSELY TOGETHER IN CONDUCTING OVERSIGHT OF THESE IMPORTANT PROGRAMS, BECAUSE STATE AND FEDERAL RESPONSIBILITIES FOR HAZARDOUS WASTE CLEAN UP ARE CLOSELY LINKED.

CALIFORNIA WAS ONE OF THE FIRST STATES TO ENACT ITS OWN SUPERFUND LAW, AND WE HAD HOPED THAT OUR READINESS TO MATCH FEDERAL SUPERFUND MONIES WOULD ENSURE QUICK ACTION TO CLEAN UP CALIFORNIA'S MANY DANGEROUS DUMP SITES. WE HAVE, NEEDLESS TO SAY, BEEN DEEPLY DISAPPOINTED AT THE EXTENT OF BUREAUCRATIC FOOT DRAGGING AND ENDLESS DELAY WHICH HAS CHARACTERIZED THE ADMINISTRATION OF SUPERFUND BY EPA.

WHILE CALIFORNIA'S OWN STATE BUREAUCRACY CONTINUES TO FRUSTRATE MANY OF US IN THE LEGISLATURE, WE CANNOT SOLVE THE VERY REAL PUBLIC HEALTH PROBLEMS POSED BY HAZARDOUS WASTE THROUGH STATE LEVEL REFORMS ALONE. BECAUSE OUR FUNDS ARE SO LIMITED AND OUR WASTE PROBLEMS SO GREAT, WE ARE DEPENDENT ON A SUSTAINED FINANCIAL COMMITMENT FROM THE FEDERAL GOVERNMENT, NOT TO MENTION THE NEED FOR FEDERAL SUPPORT FOR SCIENTIFIC AND APPLIED RESEARCH TO DEVELOP NEW AND SAFER TECHNOLOGIES TO DISPOSE OF HAZARDOUS WASTE.

WHILE THE REAGAN ADMINISTRATION'S CUTS IN EPA'S RESEARCH AND ENFORCEMENT BUDGETS HAVE CLEARLY DAMAGED HAZARDOUS WASTE

MANAGEMENT EFFORTS, WHAT HAS BEEN MOST DISTURBING FROM CALIFORNIA'S PERSPECTIVE IS THE CONTINUING FAILURE OF EPA TO EFFECTIVELY UTILIZE THE $1.6 BILLION MADE AVAILABLE BY CONGRESS FOR CLEAN UP OF HAZARDOUS WASTE SITES. THE EXCUSES HAVE VARIED, BUT THE FACTS ARE INESCAPABLE. THE JOB CONGRESS DEMANDED HAS NOT BEEN DONE!

WE ARE ALSO CONCERNED WITH THE APPROACH WHICH HAS BEEN TAKEN WITH REGARD TO PUBLIC PARTICIPATION IN THE POLICY DECISIONS GOVERNING CLEAN UP ACTIVITIES. AS WE SAW VIVIDLY THIS MORNING, THE INTERIM SOLUTIONS WHICH HAVE BEEN ATTEMPTED AT STRINGFELLOW HAVE FAILED TO PROTECT PUBLIC HEALTH. WHILE SOME OF THE PAST MISTAKES ARE CLEARLY DUE TO THE "LEARNING CURVE" OF THIS DIFFICULT SITE, THE LONGSTANDING CONCERNS OF LOCAL RESIDENTS WITH THE PROPOSED "SOLUTIONS" HAVE BEEN BORNE OUT. THE "LEAST COST" APPROACH WHICH APPEARS TO HAVE BEEN EPA POLICY, HAS BEEN DISCREDITED. MORE IMPORTANTLY, THE FAILURE TO LISTEN TO AND WORK WITH THE PEOPLE MOST AFFECTED BY THESE DECISIONS HAS NEARLY DESTROYED THE PUBLIC'S CONFIDENCE THAT THEIR HEALTH AND THEIR COMMUNITIES WILL BE PROTECTED.

FINALLY, DESPITE THE FAILURE AND FRUSTRATIONS OF THE PAST, WE MUST JOIN IN AN EFFORT TO RECOVER THE MOMENTUM WE HAVE LOST AND REDOUBLE OUR EFFORTS TO MAKE THESE PROGRAMS WORK THE WAY THEY WERE INTENDED. AT THE SAME TIME, WE MUST ALSO FIND NEW WAYS TO ENCOURAGE THE RAPID DEVELOPMENT OF NEW WASTE DISPOSAL AND TREATMENT TECHNOLOGIES SO THAT WE CAN SIGNIFICANTLY REDUCE THE ENVIRONMENTAL AND HEALTH RISKS OF HAZARDOUS WASTE DISPOSAL.

THE CHALLENGES WE FACE ARE ENORMOUS, BUT THE PUBLIC EXPECTS NOTHING LESS THAN AN ALL OUT COMMITMENT TO THEIR ULTIMATE SOLUTION.

Mr. BROWN. Thank you very much, Sally. I would now like to recognize Congressman Al McCandless, the former supervisor for Riverside County, who has joined us for this hearing. I want to express my appreciation to him for being here and ask him if he has any remarks to make at this point.

STATEMENT OF HON. ALFRED A. McCANDLESS, CONGRESSMAN, U.S. HOUSE OF REPRESENTATIVES

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Congressman Brown and I serve on a committee that looks into things of this nature for the benefit of the Nation as a whole. I welcome the opportunity to meet here today and review the circumstances surrounding the subject in question.

The concern I have is the health and welfare of those people who live in the area. We are all here to examine the best way to expedite the cleanup.

We don't want anyone to be concerned about the quality of their drinking water or any of the other possible dangers created by hazardous waste. About $6 million has already been spent since 1972 on the cleanup measures at Stringfellow. The arrival of Superfund in 1980 gave hope that Federal funds would speed up the cleanup process. In 1982, the Superfund staff signed a funding package with the State.

The cost of the Stringfellow cleanup could reach possibly $40 million. Today, we need to examine what I consider to be the three basic issues in question: How can we provide the greatest margin of safety for the residents? Two, how quickly can cleanup begin and proceed through completion and, three, review EPA's research activities in addressing long-term cleanup of hazardous waste dumpsites.

I appreciate the opportunity to join with Congressman Brown and the other members of the panel in addressing the problems of toxic waste disposal and the scope of its effects.

Thank you, Mr. Chairman.

[The prepared statement of Mr. McCandless follows:]

HONORABLE ALFRED A. McCANDLESS

HEARING ON THE SRINGFELLOW ACID PITS

ONTARIO, CALIFORNIA

APRIL 22, 1983

GOOD AFTERNOON.

I WELCOME THE OPPORTUNITY TO MEET WITH YOU AND REVIEW THE CIRCUMSTANCES SURROUNDING THE STRINGFELLOW TOXIC WASTE SITE.

THE CONCERN I HAVE IS THE HEALTH AND WELFARE OF THOSE WHO LIVE IN THIS AREA, AND THAT'S THE REASON I'M HERE. WE ARE ALL HERE TO EXAMINE THE BEST WAY TO EXPEDITE A CLEAN-UP.

WE DO NOT WANT ANYONE TO HAVE TO BE CONCERNED ABOUT THE QUALITY OF DRINKING WATER OR ANY OF THE POSSIBLE DANGERS CREATED BY HAZARDOUS WASTE.

ALMOST $6.Ø MILLION HAS BEEN SPENT SINCE 1972 ON CLEAN-UP MEASURES AT SRINGFELLOW. THE ARRIVAL OF SUPERFUND IN 1980 GAVE HOPE THAT FEDERAL FUNDS WOULD SPEED UP THE CLEANUP PROCESS. IN 1982, THE SUPERFUND STAFF SIGNED A FUNDING PACKAGE WITH THE STATE.

THE COST OF STRINGFELLOW CLEAN-UP COULD POSSIBLY REACH AS MUCH AS $40.MILLION.

TODAY WE NEED TO EXAMINE THREE BASIC ISSUES:

1. HOW CAN WE PROVIDE THE GREATEST MARGIN OF SAFETY FOR THE RESIDENTS.
2. HOW QUICKLY CAN CLEAN-UP BEGIN AND PROCEED THROUGH COMPLETION; AND
3. REVIEW EPA'S RESEARCH ACTIVITIES IN ADDRESSING LONG-TERM CLEAN-UP OF HAZARDOUS WASTE DUMP SITES.

I APPRECIATE THE OPPORTUNITY OF JOINING WITH CONGRESSMAN BROWN AND THE OTHER MEMEBERS OF THE PANEL IN ADDRESSING THE PROBLEMS OF TOXIC WASTE DISPOSAL AND THE SCOPE OF IT'S AFFECT.

Mr. BROWN. Thank you, Al. Do any of the other members care to make a brief statement to begin with? Nobody has to, of course.

Now, the format this afternoon will be as follows. We have four panels and I have switched the order to ask the panel representing the local communities to appear first. Following that, we will have Federal Government witnesses, witnesses from the State of California and then a panel of expert witnesses who are familiar with the problems and technologies of toxic waste disposals. They will be the last panel we will hear from this afternoon.

So, I would like to ask Penny Newman and Cecil Johnson if they would come up at this point. I am going to call on Penny Newman who is president of the Concerned Neighbors in Action to speak first and ask Penny and Mr. Johnson to identify the additional witnesses that have accompanied them. Ms. Newman.

STATEMENT OF PENNY NEWMAN, PRESIDENT, CONCERNED NEIGHBORS IN ACTION, GLEN AVON, CA.

Ms. NEWMAN. My name is Penny Newman. I am chair of Concerned Neighbors in Action, which is a group here in the communities of Glen Avon and Pedley that have devoted their time to the cleanup of the Stringfellow acid pits. I have also recently been designated by our elected county representative, Supervisor Melba Dunlap, to act as the coordinator for all the various Stringfellow advisory committees, as recognition of our role in this very complex issue.

I would also like to thank all the people in the community who have turned out today to let our elected officials know how we feel on this subject. We are very concerned and we want you to know that.

I would like to thank the committee for scheduling this hearing and let me restate the subject of the hearing in terms which give us as members of the community, that is most affected, a perspective on the national scandals regarding the Environmental Protection Agency's handling of this dump. The true scandal is that EPA will not pay for a complete cleanup of our site, not simply that EPA has delayed giving the $6 million reimbursement to the State

for work already completed and already ineffective. I believe the two items are connected, though.

The fact that this hearing is being held in the community is very important to us. I don't know if I can express to you the sense of isolation and powerlessness we have experienced in the last 5 years. We have tremendous fear, but also frustration, anger and mistrust, which is directed toward various government officials handling the site.

It all started for me in 1979 with the intentional release of more than 1 million gallons of poisonous water into our community by the regional water quality control board, and their failure to inform us of their actions. Our children walked through those chemicals and no one responsible made any effort to tell us.

Recently, we have heard a great deal about various manipulations regarding funding of Stringfellow and decisions made in places far away from us, like Washington and Sacramento, but here in Glen Avon is where the impact of those manipulations and decisions are felt. We live with them, even though we cannot have any role in the shaping of them, because of the distance or because of the barriers of bureaucracy.

That means that we have to depend on our government officials. Sometimes they make mistakes. We'd like to help them avoid them. We work very hard to understand what is taking place and to contribute in a positive manner. Even with rigorous oversight, we realize some errors are inevitable. We make them, too. What is inexcusable is for our government officials to lie to us and that is what has happened here. [Applause.]

I would like to quickly summarize some of the problems: Cost, as opposed to effectiveness, is the prime factor in deciding how a dump cleanup should be done. The Environmental Protection Agency wants to keep expenditures from CERCLA, the Federal Superfund, to a minimum, in order to avoid taxing hazardous waste generators. CERCLA permits EPA to collect $1.6 billion over a 4-year life of the program, but not to allow more than $760 million to aggregate at any one point. Not spending the money or spending as little as possible allows EPA to avoid taxing hazardous waste creating corporations or to settle enforcement actions with responsible parties for a fraction of the cost of an effective cleanup. For those reasons, the Environmental Protection Agency has pressured the State to promote the cheap cleanup at Stringfellow.

In the case of some State officials, the desire to recoup the State's past expenses requires that they prove that the current mitigation measures are effective regardless of the facts. If the State were now to admit or to acknowledge criticism that the clay cap on the Stringfellow site isn't working, then EPA could beg off paying for past work on the grounds that it was ill conceived.

Constructing a clay cap, a civil engineering remedy to a toxic health threat to our community, was justified by a December 1979 civil engineering consultant's report. Many considered that report flawed and because of its flaws, the State water resources control board required a public hearing to be held in this community by the regional board. Public commentary at that hearing, also in 1980, so damaged the credibility of the consultant's report and his recommendations, that the regional board selected total removal of

liquid wastes and the contaminated soil at the site as the most cost-effective solution.

Since the strongest and soundest criticism of the cleanup of the dump have come from the community, officials soon found it necessary to avoid telling us of vital issues, excluding us from meetings or to outright lie to us. Locally, Jim Anderson has kept silent for 2 years the fact that carcinogens were in the groundwater. Now, he makes a very weak excuse that it was a medical question and not in his realm of concern. [Applause.]

At the State level, Tom Bailey works to discredit us. According to a Department of Health Services memo and I quote, "Bailey has alienated the community at Stringfellow by several tactics: (a) His comments that total removal is impossible since the wastes have percolated into the fractured bedrock is an effort to make Penny Newman look silly. She clearly understands that extraction wells will have to be continued to pump out the leachate plume. She has been referring to Jim Anderson's alternative 6. The fact that he continues to attempt to undercut her credibility is insulting to the entire community." [Applause.]

The same memo also documents doubts raised by Bailey's staff as to the effectiveness of the clay cap. "The question has been raised that the emphasis on augmenting the cap is a defensiveness regarding past decisions and the concern that if we admit the cap is ineffective, EPA will not reimburse the $3 million that Jim Anderson and the regional board has spent on interim abatement measures."

We are very concerned now that Bob Stephens has been removed as head of the Toxic Substances Control Division, that there is no one who will ensure that the lies and skullduggery will not continue. As nearly as we can reconstruct the situation, Bob Stephens was alerted to deficiencies in the clay cover as a final closure mechanism and eventually forced EPA to fund feasibility studies for a wide range of possible solutions to this threat.

He committed himself to a formal process of public participation in key Superfund decisions. For those of you who still question or doubt the value of public participation, I would like to point out an incident that happened recently regarding this community's health study. At a meeting of the local health advisory committee, I was shown a map of the area to be studied for health effects. An area that was outlined as a control area is where I live. When I pointed out that our children attend the Glen Avon School and, therefore, have been contaminated, they were very surprised. If I had not pointed that out to them, they would have been comparing children who have already been exposed as a control group with children who they acknowledge as being exposed. That means that we would have spent $150,000 of the State's money on a report that would have gone into the garbage.

Anyone in this community could have pointed that out. It, once again, points out how they look at facts, they look at reports and they don't put it into the context of this community. [Applause.]

Bob Stephens had promised to include in his request for funding from EPA money to pay for an independent technical advisor, who could help us detect flaws similar to those found in the studies of

the regional board's consultants and to help us develop effective responses to technical issues.

Now, decisions which will affect our community and our health will be made by another civil engineer, not a health expert or even a chemical engineer. Immediately after Bob Stephen's removal from his post, Tom Bailey released a press statement indicating that EPA funding could soon be expected in an amount sufficient for augmenting the clay cap.

These are decisions that we bear the consequences of. Let me again stress the severity of these consequences. The first monitoring of ground water since 1980 was conducted last month. It was also the first evaluation of ground water samples for synthetic organic chemicals. Only now have they started to look at them in our drinking water and the results aren't back yet. But members of this community have long suspected that this could be a problem and we have pointed out many times references in reports to chemical solvents disposed of at the site or found in samples of contamination.

Now, that the patronizing assurances that we have nothing to worry about are proven wrong, here is what we have to live with: toluene, trichloroethylene, methylene chloride, chloroform, 1,2 dichloroethene, perchloroethylene, acetone, methyl isobutyl, ketone and methyl ethyl ketone. Several of these compounds have been found in levels which far exceed State and Federal drinking water standards.

Two of these chemicals are proven human carcinogens and are unsafe to drink at any concentration. Yet, the concern that the monitoring program at the dump was poorly conceived was not confined to us. Notes of a July 8, 1980, State cabinet level toxic substances coordinating council meeting on a presentation by Jim Anderson on Stringfellow quote one participant as calling the monitoring program "woefully inadequate."

Not everyone has taken the lax attitude toward the acid pits solution. I would like to applaud Congressman George Brown, who represents this district, for his early concerns about the effective solution of this fight. In a letter to Jim Anderson dated January 30, 1979, Congressman Brown said:

> Although the current plan to cap the site is a justifiable interim step, it may not be a viable long term solution. Draining and covering the pits should prevent further washouts, but the proposed subsurface dam and pumping arrangement may not be adequate to stop migration of hazardous materials into regional groundwater supplies. Costs of properly cleaning up the site and protecting the public and environment will probably be large. However, the costs of not adequately cleaning up the site are enormous, not only in dollars for remedial efforts, lawsuits and lost water resources, but also in eroded credibility of the individuals who failed to live up to their responsibilities.

This erosion of credibility is as deep as the erosion of the cap this last winter. Neither the statements of the Government officials nor the clay cap can hold much water at Stringfellow. Because of this loss of trust and continued evidence that these officials have not and cannot guarantee the safety of our community, we appeal to you to help us. Specifically, you must do the following:

One, we ask both committees to provide an oversight mechanism for implementation of the Stringfellow cleanup. Both State and Federal Superfunds must be amended to permit public participa-

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tion in a formal and open decisionmaking process. In order to allow us to be adequately prepared, we must have the assistance of an independent, but government paid, technical advisor of our selection.

Two, we ask the help of the Assembly Consumer Protection and Toxic Materials Committee in ensuring that the intent of the feasibility study, drafted under Bob Stephens' direction, be fully and honestly implemented. It includes a wide range of possible alternatives for remedial action. We also ask that we be included in the decisionmaking which takes place very soon, as Bob Stephens had promised.

Mrs. Tanner, as chair of that committee, we really need your help. We are asking that you set up a meeting with Governor Deukmejian to discuss our problem with representatives of this community. Can you help us? [Applause.]

We ask that the House Committee on Science and Technology guarantee that the Environmental Protection Agency not violate this process, as they apparently do now. I especially would ask the chair of that committee, Congressman Scheuer, to meet with EPA Administrator Ruckelshaus to ensure this. Mr. Ruckelshaus must alter EPA policy to permit CERCLA money to be expended on independent technical advisors for community groups and guarantee that the section of the Cooperative Agreement submitted by the State of California for the community relations plan be accepted.

In the summer of 1982, we joined a coalition of 22 groups similar to ours to develop a set of 9 principles of public participation. In Washington, we met with former EPA Administrator, Anne Gorsuch Burford, where we discussed in good faith these same issues with her. We assumed that she would keep that faith, but now we know that she lied to us. Although our faith in this administration has been shattered, we must go forward. Please help us. [Applause.]

I am attaching for the record several pages of documentation of the points that I have raised in my statement. I would like to leave the technical issues aside briefly and go over some of the EPA pressure tactics for the inadequate, but cheap, cleanup.

In coming to a decision about what needed to be done with Stringfellow, we had a hearing in 1980. As a result of that hearing, and I quote,

> The regional board quite reasonably found Alternative No. 6 as outlined in the Montgomery report entitled "Report on Phase I Work for Closure of Stringfellow Class I Hazardous Wastes Disposal Site," the Montgomery report of 1979, as the most appropriate alternative for abating the nuisance conditions at the Stringfellow site, giving due consideration to the effectiveness of the available alternatives, possible environmental risks associated with the alternatives and cost.

By October 1980, the regional board had expended a considerable amount of its budget on various interim measures, including removal of liquid waste. In a phone call to EPA, region 9, Jim Anderson advises that Stringfellow is likely to be named as the State's No. 1 priority for Federal Superfund consideration. Notes of this phone conversation, obtained from Citizens for a Better Environment, continue,

> He stated that he would be willing to assist us in any way necessary in expediting the Superfund process. Next, he states that with additional excavation being done at Stringfellow, that cost overruns would likely occur in its closure. It was impossible

for him to determine at this time how much additional monies would be needed. He stated that he would have some difficulty borrowing money from the State coffers, but it probably could be done if EPA guarantees were received regarding eventual funding for Stringfellow.

A note on that—

No guarantees or hints of guarantees were made by me.

On November 12, 1981, Governor Brown called for EPA to expedite funding for total removal of the remainder of the wastes at the site, still considered by the State as the most cost-effective solution. An EPA Record of Communication dated November 17, 1981, covers a conversation between an EPA region 9 staff person and John Boss of department of health services. It says,

Boss did not know anything about the Governor's letter for complete removal at Stringfellow. If the letter has been sent, it paints DOHS into a box of requesting complete removal from region 9. If this is the case, I explained that region 9 could not, in good conscience, forward the request for complete removal to headquarters. Boss will check into the Governor's letter.

Already, even before EPA has justified its position by evaluating the site completely, they have begun to pressure the State.

On December 10, 1981, another Record of Communication recounts a phone conversation between Keith Takata of EPA region 9 and Wade Cornwell of the department of health services, which demonstrates further pressure on State officials. It reads,

Penny Newman, who is the head of a citizen's group in Glen Avon, is meeting with the Governor's office, DOHS, the water board on Stringfellow. I told Cornwell that the Regional administrator, Sonya Crow, was concerned that the present construction * * *

The clay cap—

* * * may not be perceived by the State as the final solution. She has asked that the Superfund coordinator internally discuss the matter with Carla Bard.

A January 11, 1982, Record of Communication covers a phone conversation between Paul Nadeau of EPA Headquarters to an EPA region 9 staff person. The memo says, "In relation to Stringfellow——

Mr. BROWN. Could you suspend for just a moment? Could you tell me approximately how much more you have to go?

Ms. NEWMAN. Not very much. Just a couple of minutes.

Mr. BROWN. All right.

Ms. NEWMAN. I hope that you understand. Our community does not get much input very often, so when we have an opportunity, we have to get the information across. I think the information I have is important. [Applause.]

This particular memo is especially bothersome to me. I think it clearly points out EPA's attitude toward Stringfellow and other sites.

The memo says,

In relation to Stringfellow, closure would probably not have a major problem in meeting the How Clean is Clean guidelines now being prepared. However, the groundwater contamination downslope from the site may be another matter. The feeling was that unless major groundwater contamination was now occurring, it may not meet the How Clean criteria. In addition he stated that the most cost effective alternative might be to put all locals on bottled water rather than their continued use of groundwater. He wondered if the State had looked at that alternative. I stated that that was doubtful, since they had always assumed that the groundwater

contamination had to be abated. He realized that there was some potential political implications.

Does some bureaucrat in Washington understand how precious ground water is in California? Is the State of California wrong in assuming that ground water contamination ought to be abated? There are definitely political implications here.

On April 2, I met with Anderson and Clint Whitney of the State board, Ken Finney and Michael Picker of the Governor's office and Tom Bailey of the department of health services. In that meeting and notes that we have of that meeting, Jim Anderson reports, and I quote,

DOHS must review any alternative action and decide if work will (a) be sufficient to protect public health, and (b) protect the environment before any State request can go forward to EPA.

His note:

If DOHS disagrees with EPA on alternative analysis, the State may not receive Federal help and must do the work without Federal Superfund.

Obviously, EPA is again putting pressure on the State.

On May 13, David Mowday, the coordinator for EPA region, writes to Robert Stephens, the new head of the Department's Toxic Substances Control Division. The letter says,

Region 9's funding requests for the Iron Mountain Mine and Stringfellow sites have been delayed pending certain decisions by the State. In view of these continuing delays, I must emphasize that competition at the national level for the limited Superfund money underscores the need for the State to arrive at timely decisions with respect to these two sites. The resolution recently adopted by the Water Board requested that the Department make a final decision on the cost effective remedial measure. While delaying the funding request, we had been assured by the Department that its review of the full range of the project alternatives would lead to the selection of the preferred State alternative within a short time frame.

Again, referring to the clay cap.

A letter from Stephens to Mowday on June 9 sets a timetable for finding a cost effective alternative. It sets aside June 15 for conferring with the community. Scrawled across the top, under the approvals of various managers over the staff person who drafted the letter are the words "Washington pressure." The letter states that augmenting the clay cap through several additional measures will constitute final mitigation. We are still being told that total removal is the State's solution to Stringfellow.

That same day, June 9, I talked with Bob Stephens on the telephone. My letter to him on June 13 recounts that conversation. It says in part,

I was delighted to talk with you on the telephone last Friday and was heartened to hear that the process for formulating a remedial action plan for Stringfellow for submittal to EPA is still wide open, in your words, and that no decisions have been made. I am also heartened that we are in agreement on the importance of public input into the remedial action planning process, especially input from the Glen Avon community. However, I am concerned that the timeline for the planning process is not designed to allow for meaningful public input. Tom Bailey has told me that Region 9 has been constantly pressuring him to produce an action plan as quickly as possible. Mr. Bailey went so far as to say that Region 9 has implied that CERCLA funds will be lost to Stringfellow if the action plan is not produced soon.

A subsequent letter from me dated the 15th calls for the cost of clean up to be billed to the industries responsible for the wastes at Stringfellow as a means of financing the cleanup. Looking through

the files available to me, this is the first time recovery of costs of clean up from the responsible parties is discussed. Later, EPA uses this as an excuse for delays in reimbursing the State for moneys expended in the interim abatement. At this point, I was not suggesting lengthy delays, but expected the clean up first and the legal actions later. [Applause.]

The documentation that I have available through the various memos from EPA that were received through a Freedom of Information Act, through Citizens for a Better Environment, the information that I have gathered over the years, all of this documentation clearly shows EPA was blackmailing the State into accepting the clay cap as a final method. We now know that that clay cap does not work. [Applause.]

To continue to put good money after bad is absolutely ridiculous and criminal at this point. The longer we wait to do a permanent solution to that site, the longer we nickel and dime this situation, the more the disaster is going to be here in Glen Avon. We will contaminate our drinking water. We will continue to expose people to these hazardous chemicals and the people of Glen Avon will not take it any longer. [Applause.]

I am requesting that our elected officials, those of you who have oversight on the departments at question at this point, EPA and department of health services, please do your job. We look upon you to help protect us. We found out that the Government officials won't do that. It is up to you.

Thank you.

[The prepared statement of Ms. Newman, with attachments follow:]

Concerned Neighbors In Action

TESTIMONY OF PENNY NEWMAN, CHAIR, CONCERNED NEIGHBORS IN ACTION BEFORE THE JOINT HEARING ON THE STRINGFELLOW ACID PITS

APRIL 22, 1983

I'm Penny Newman, Chair of Concerned Neighbors in Action, which is a group here in the communities of Glen Avon and Pedley devoted to the cleanup of the Stringfellow Acid Pits. I've recently been designated by our elected county representative, Supervisor Melba Dunlap, to act as the coordinator for all the various Stringfellow advisory committees, as recognition of our role in this complex issue.

I'd like to thank the Committees for scheduling this hearing. Let me restate the subject of the hearing in terms which give us, as members of the community most affected, a perspective to the national scandals regarding the Environmental Protection Agency's handling of the dump. THE TRUE SCANDAL IS THAT EPA WILL NOT PAY FOR THE COMPLETE CLEANUP OF THE DUMP, NOT SIMPLY THAT EPA HAS HELD UP A $6 MILLION REIMBURSEMENT TO THE STATE FOR WORK ALREDY COMPLETED AND ALREADY INEFFECTIVE. But I believe that the two items are connected.

The fact that the hearing is being held in the community is very important to us. I don't know if I can express the sense of isolation and powerlessness we have experienced in the last 5 years. We have tremendous fear, but also frustration, anger and mistrust, which is directed toward various government officials handling the site. It all started, for me, in 1979, with the intentional release of more than a million gallons of poisonous waste into our community by the Regional Water Quality Control Board (the Regional Board), and their failure to inform us of their actions. Our children walked through those chemicals and no one responsible made any effort to tell us.

Recently, we have heard a great deal about various manipulations regarding funding of Stringfellow, and decisions made in places far away from us, like Washington or Sacramento. But here in Glen Avon is where the impact of those manipulations and decisions are felt. We live with them, even though we cannot have any role in shaping them, because of the distance, or because of the barriers of bureaucracy. That means that we have to depend on our government officials. Sometimes they make mistakes. We'd like to help avoid them, and we work hard to understand what is taking place and to contribute in a positive manner. Even with rigorous oversight we realize some errors are inevitable. We make them too. What is inexcusable is for our government officials to lie to us. And that is what has happened here.

I'd like to quickly summarize some of the problems:

1. Cost, as opposed to effectiveness, is the prime factor in deciding how a dump cleanup should be done. The Environmental Protection Agency wants to keep expenditures from CERCLA (the Federal Superfund) to a minimum, in order to avoid taxing hazardous waste generators. CERCLA permits EPA to collect $1.6 billion over the four year life of the program, but not to allow more than $760 million to aggregate at any one point. Not spending the money, or spending as little as possible, allows EPA to avoid taxing hazardous waste creating corporations, or to settle enforcement actions with responsible parties for a fraction of the cost of an effective cleanup. For those reasons, the Environmental Protection Agency has pressured the State to promote a cheap cleanup at Stringfellow.

2. In the case of some State officials, the desire to recoup the State's past expenses requires that they "prove" that the current mitigation measures are "effective", regardless of the facts. If the State were now to admit, or to acknowledge criticism that the clay cap on the Stringfellow site isn't working, then EPA could beg off paying for past work on the grounds that it was ill considered.

3. Constructing a clay cap, a civil engineering remedy to a toxic health threat to our community, was justified by a December 1979 civil engeering consultant's report. Many considered that report flawed, and because of its flaws, the State Water Resources Control Board required a public hearing to be held in this community by the Regional Board. Public commentary at that hearing, also in 1980, so damaged the credibility of the consultant's report, and his reccommendation, that the Regional Board selected total removal of liquid wastes and contaminated soil at the site as the cost-effective solution.

4. Since the strongest and soundest criticism of the cleanup of the dump have come from the community, officials soon found it necessary to avoid telling us of vital issues, exclude us from meetings, or to outright lie to us. Locally, Jim Anderson has kept silent for two years the fact that carcinogens are in the groundwater. Now he makes a very weak excuse that it was a medical question, and not in his realm of concern. At the State level, Tom Bailey works to discredit us. According to a DOHS memo, "Bailey has alienated the community at Stringfellow by several tactics: (a)His comments that 'total removal is impossible' since the wastes have percolated into the fractured bedrock is an effort to make Penny Newman look silly. She clearly understands that extraction wells will have to continue to pump out the leachate plume...she is referring to Jim Anderson's alternative 6. The fact that he continues to attempt to undercut her credibility is insulting to the entire community."[26] The same memo also documents doubts raised by Bailey's staff as to the effectiveness of the clay cap. "The question has been raised that the emphasis on augmenting the cap is a defensiveness regarding past decisions, and the concern that if we admit the cap is ineffective, EPA will not reimburse the $3 million that Jim Anderson and the Regional Water Board have spent on 'interim abatement measures'".[26]

5. We are very concerned, now that Bob Stephens has been removed as head of the Toxic Substances Control Division,

that there is no one who will ensure that the lies and skullduggery will not continue. As nearly as we can reconstruct the situation, Bob Stephens was alerted to deficiencies in the clay cover as a final closure mechanism, and eventually forced EPA to fund feasibility studies for a wide range of possible solutions to this threat. He committed himself to a formal process for public participation on in key Superfund decisions. (For those of you who doubt the value of public participation, I'd like to point out an incident concerning the State's health study. At a meeting of the Health Advisory Committee, I was able to point out, knowing the community as I do, that part of the study's control group was actually potentially contaminated subjects because they attend Glen Avon school. Had the study continued to consider these residents "not exposed", the study would have been thrown off and $150,000 wasted.) At any rate, Bob Stephens promised to include in his request for funding from EPA, money to pay for an independent technical advisor, who could help us to detect flaws similar to those found in the studies of the Regional Board's consultants, and to help us develop effective responses to technical issues. Now, decisions which will affect our community and our health will be made by another civil engineer(not a health expert, or even a chemical engineer). Immediately after Bob Stephen's removal from his post, Tom Bailey released a press statement indicating that EPA funding could soon be expected in an amount sufficient for augmenting the clay cap.

These are decisions we will bear the consequences of. Let me again stress the severity of thse consequences. The first monitoring of groundwater since 1980 was conducted last month. It was also the first evaluation of groundwater samples for synthetic organic chemicals. Only now have they started to look for them in our drinking water, and the results aren't back yet. But members of this community have long suspected

that this could be a problem, and we've pointed many times to refernces in reports to chemical solvents disposed at the sites, or found in samples of contamination. Now that the patronizing assurances that we have nothing to worry about are proven wrong, here's what we have to live with: toluene, trichloroethylene, methylene chloride, chloroform, 1,2 dichloroethene, perchloroethylene, acetone, methyl isobutyl ketone and methyl ethyl ketone. Several of the compounds have been found in levelswhich far exceed State and Federal drinking water standards. Two of these chemicals are proven human carcinogens, and are unsafe to drink at any concentration. Yet, the concern that the monitoring program at the dump was poorly conceived was not confined to us. Notes of the July 8, 1980 State Cabinet level Toxic Substances Coordinating Council meeting on a presentation by Jim Anderson on Stringfellow quote one particpant as calling the monitoring program "woefully inadequate".[2]

Not everyone has taken such a lax attitude towards the Acid Pits solution. I'd like to applaud Congressman George Brown, who represents this district, for his early concerns about the effective solution to this problem. In a letter to Jim Anderson dated January 30, 1979, Congressmember Brown said, "Although the current plan to cap the site is a justifiable interim step, it may not be a viable long term solution. Draining and covering the pits should prevent further washouts, but the proposed subsurface dam and pumping arrangement may not be adequate to stop migration of the hazardous materials into regional groundwater supplies... Costs of properly cleaning up the site and protecting the public and environment will probably be large. However, the costs of <u>not</u> adequately cleaning up the site are enormous; not only in dollars for remedial efforts, law suits and lost water resources, but also in eroded credibility for the individuals that failed to live up to their responsibilities.[3]

This erosion of credibility is as deep as the erosion

of the cap last winter. Neither the statements of government officials, nor the clay cap can hold much water at Stringfellow. Because of this loss of trust, and continued evidence that these officials have not or cannot guarantee the safety of our community, we appeal to you to help us. Specifically, you must do the following:

1. We ask that both committees provide an oversight mechanism for the implementation of the Stringfellow cleanup. Both State and Federal Superfunds must be amendedto permit public participation in a formal and open decisionmaking process. In order to allow us to be adequately prepared, we must have the assistance of an independent, but government paid, technical advisor of our selection.

2. We ask the help of the Assembly Consumer Protection and Toxic Materials Committee in ensuring that the intent of the feasibility study, drafted under Bob Stephens' direction, be fully and honestly implemented. It includes a wide range of possible alternatives for remedial action. We also ask that we be included in decisionmaking which will soon take place, as Bob Stepehns promised.

3. We ask the House Committee on Science and Technology to guarantee that the Environmental Protection Agency not violate this process, as they apparently do now. I especially ask that Congressman Scheuer meet with EPA Administrator Ruckelshaus to ensure this. Mr. Ruckelshaus must alter EPA policy to permit CERCLA money to be expended on independent technical advisors for community groups, and guarantee that the section of the Cooperative Agreement submitted by the State of California for the Community Relations Plan be accepted.

In the summer of 1982, we joined a coalition of 22 groups similar to ours, to develop a set of nine principles of public participation.[27] In Washington, we met with former

EPA Administrator, Anne Gorsuch, where we discussed, in good faith, these same issues with her. We assumed that she would keep that faith, but now we know that she lied to us. Although our faith in this administration has been shattered we must go forward. Please help us.

I'm attaching, for the record, several pages of documentation of the points I raised in my statement. I'd be glad to answer any questions you may have. Thank you.

RECONSTRUCTION OF EVENTS AT THE STRINFELLOW ACID PITS

The material presented here comes from a variety of sources. I'll be glad to show you the copies in our files, or you can refer to the notes at the end of this statement. Many of the documents were provided to me by Michael Belliveau, Reseach Associate for Citizens for a Better Environment in San Francisco. He obtained them through a Freedom of Information Act request. Others have been collected through the years. Some of the events are related as they happened to me.

--- In May of 1980, five members of Concerned Neighbors and I traveled to Sacramento to request at a hearing of the State Water Resources Control Board (State Board) that they direct the Santa Ana Regional Water Quality Control Board (Regional Board)to hold a hearing in the Riverside area. The purpose of this hearing was to bring out information and problems not addressed by Regional Board staff (and their consultants) as part of the selection of remedial options for the Acid Pits. Part of the information that convinced the State Board that it was necessary to look into the matter further, and to listen to conerns of the community, was testimony developed by Paul Blanc of the CED Cancer Project. "The State has financed lenghty engineering reports to evaluate such closure. Careful reading of these studies shows that the safest and surest approach to this problem is the complete removal and safe disposal of all feasible solid and liquid waste from the site. In spite of this, the State is being asked to choose between either of two alternatives, both of which, according to the State's own reports, offer greater risk to the public at a

questionable reduction of cost. These cost reductions, are questionable, because, in less than six months, the estimates of both cost and technical difficulty of these alternative approaches have soared to the point where their original premise seems faultier than the bedrock upon which the dumpsite now seems to have been founded.

"The extent of increased risk inherent in such alternatives is a crucial public health issue which has never been evaluated, nor is a technical engineering competent to do so. The chemical carcinogens and teratogens (substances which cause cancer and birth defects) that are the long-term hazard of such dumps as Stringfellow, have no safe level for public exposure. Cadmium and chromium, both of which have been detected off-site at Stringfellow at serious levels, are known human carcinogens. Chlorobenzene and chlorophenols, also major off-site contaminants, have unknown chronic low-level effects. Caution is our safest public policy in these matters.... The State is being asked to rely on a methodology specifically attacked by the Congress in its Subcommittee on Oversight and Investigation of the House Committee on Interstate Commerce. The practice specifically attacked is the use of a clay cover to control chemical waste where there is question of groundwater seepage. This is exactly what was done at Love Canal, and it is what is proposed at Stringfellow, even though it has become clear that bedrock fracture, subsurface inflow, and a deeper groundwater basin make such seepage inevitable. This clay cover is supposed to be combined with chemical fixation or neutralization, methods which are expensive, poorly proved, and in any event will at best

only reduce metal leachates, but not eliminate its long term source. It is a model of time release poison.

"The original study (December 1979)[4] never adequately evaluated the alternative of removal of both liquid and solid contaminants. It defined this alternative in terms of cost even in a section where the costs of other approaches was not discussed. Clearly the State was never meant to consider this approach. This bias is combined with inaccuracy and miscalcalculation... Evaluations which find it difficult to conceive of abnormally heavy rainfall may find the long term health effects of low level carcinogens difficult to conceptualize."[5]

Many elements of our later criticisms of the cleanup program at the Acid Pits are contained here. However, outside of the considerations of the State and Regional Board, the issues raised are never fully addressed. In fact, the December 1979 report of James M. Montgomery, Consulting Engineers ,which the State Board found severely flawed on the basis of Paul Blanc's testimony , is the sole justification used by all future decisions as to the cost effective method of action.

---At the Hearing of the Regional Water Board on July 2nd, 1980, the Board heard these same arguments, as well as additional information on the geology of the site, provided by Dr. Stiermann. In further commenting on the cap alternative, Allegra Hamman, an occupational health specialist who later became an assistant to Don Vial, Director of the Department of Industrial Relations,

said "... I would also add that given the high concentration of organics at the site, it is ill advised to expect that the "neutralization" process proposed to accompany the clay capping procedure would actually neutralize all wastes left at the site. "Neutralization" as described in the Montgomery report simply binds the inorganic materials, that is the metals."[6]

Based on this additional information, not incorporated in the reccommendations of the staff and their consultant, the Regional Board quite reasonably found that: "The Regional Board has identified Alternative Number 6, as outlined in the Montgomery report entitled 'Report on Phase I Work for Closure of Stringfellow Class I Hazardous Wastes Disposal Site' (JMM December 9, 1979) as the most appropriate alternative for abating the nuisance conditions at the Stringfellow site, giving due consideration to the effectiveness of the available alternatives, possible environmental risks associated with the alternatives, and cost."[7]

These two hearings are critical to understanding the issue before us today. These are the only open discussions of the effectiveness of various remedial alternatives at the Stringfellow site. All other findings are based on incomplete information, and primarily on the basis of the JMM December 9, 1979 reccommendations that onsite containment is the cost-effective solution. No response is ever made to the criticisms of the content of that report. And, although lip service is paid to the decision of the Regional Board, it is rarely accorded any

weight in the deliberations of State or EPA officials.

--- In a State document entitled "Interagency Status Review of 1980" requested by the high level Toxic Substances Coordinating Council, and prepared by the State Water Board, reference is again made to organic chemicals being found in liquid waste found onsite, as well as strong concerns raised about the extent and nature of the underground contamination extending offsite (leachate plume).[8] Yet Jim Anderson consistently claimed that aside from DDT, no organics were present on the site.

--- By October of 1980, the Regional Board has expended a considerable amount of its budget on various interim measures, including removal of liquid wastes. In a phone call to EPA Region 9, Jim Anderson advises that Stringfellow is likely to be named as the State's number one site for Federal Superfund consideration. Notes of this phone conversation (obtained from CBE) continue..."He stated that he would be willing to assist us in any way necessary in expediting the Superfund process. Next, he states that with additional excavation being done at Stringfellow, that cost overruns would likely occur in its closure. It was impossible for him to determine at this time how much additional monies would be needed. He stated that he would have some difficulty borrowing money from the State coffers, but it probably could be done if EPA guarantees were received regarding eventual funding for Stringfellow (eg signing of a Cooperative Agreement). NOTE: No guarantees or hints of

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guarantees were made by me." [9]

---On November 12, 1981, Governor Brown called for EPA to expedite funding for total removal of the remainder of the wastes at the site, still considered by the State as the most cost effective solution. The demand was prompted, according to the letter, because "the discovery last week of an ancient underground streambed carrying toxic waste away from Stringfellow and toward the Glen Avon neighborhood adds urgency to the cleanup."[10]

---An EPA Record of Communication dated November 17th, 1981 covers a conversation between an EPA Region 9 staff person and John Boss of DOHS. It says "Boss did not know anything about the Governor's letter for complete removal at Stringfellow. If the letter has been sent, it paints DOHS into a box of requesting complete removal from Region 9. If this is the case, I explained that Region 9 could not in good conscience forward the request for complete removal to HQ. Boss will check into the Governor's letter." [11] Already, even before EPA has justified its position by evaluating the site completely, they have begun to pressure the State.

---On December 10th of 1981, another Record of Communication recounting a phone conversation between Keith Takata of EPA Region 9 and Wade Cornwell of DOHS demonstrates further pressure on State officials, "Penny Newman, who is the head of a citizen's group in Glen Avon, is meeting with the Governor's office, DOHS,

and SWRCB on STringfellow. I told Cornwell that the R(egional) A(dministrator) (Sonia Crow) was concerned that the present construction may not be perceived by the state as the final solution. She has asked the Superfund Coordinator to internally discuss the matter with Carla Bard..."[12]

---An internal EPA document, called "The Request for Funding for Stringfellow Site" is dated December 18, 1981. It states: "Based on the conclusions and reccommendations of a December 1980 study, "Engineering and Economic Evaluation of Transferring Waste from the Stringfellow Class I Disposal Site"[13] (JMM 12/80), completed for the State of California, we have concluded that the onsite containment currently under construction is the cost effective alternative, and therefore the appropriate final solution."[14] Yet, this report, JMM 12/80 assesses no new data on the physical characteristics of the site. It specifically refers to the reccommendation of Alternative 3 as defined in their previous report, JMM December 9, 1979. The EPA document makes no mention of the concerns raised at either of the Water Boards' public hearings. In other words, the determination is based entirely on the basis of cost, without any assessment of effectiveness!!.

--- A January 11, 1982 Record of Communications covers a phone call from Paul Nadeau of EPA Headquarters to an EPA Region 9 staff person. The memo says "In relation to Stringfellow, closure would probably not have major problem in meeting the How Clean is Clean guidelines now being prepared. However, the groundwater contamination downslope from the site may be another

matter. The feeling was that unless major groundwater contamination was NOW occurring, it may not meet the How Clean criteria. In addition, he stated that the most cost-effective alternative might be to put all locals on (bottled?) water rather than their continued use of groundwater. He wondered if the State had looked at that alternative. I stated that was doubtful, since they had always assumed that the groundwater contamination had to be abated. He realized that there was some potential political implications..."[15] This is one of the most troubling of all the EPA documents. Were the How Clean criteria revised to allow a cheaper, and less effective cleanup at Stringfellow? Is it effective to abandon the Chino Aquifer to wastes from Stringfellow? Is it cost effective? Does some bureaucrat in Washington understand how precious groundwater is to California? Is the State of California wrong in assuming that groundwater contamination ought to be abated? There are definitely politcal implications here.

---About this time, I became concerned that the State, while continuing to tell me that total removal was still considered the cost effective method of abatement, planned to simply leave the Acid Pits as they were, after completing construction of the interim abatement. Jim Anderson was talking about going to the Regional Board, and drafting a resolution declaring the interim abatement as a final closure for the April 5th Board meeting. I asked the Governor's office to set up a meeting. On April 2nd, I met with Anderson and Clint Whitney of the State Board, Ken

Finney and Michael Picker of the Governor's Office, and Tom Bailey, of the Department of Health Services. Bailey had just been hired to be the State's Superfund Coordinator, acting as lead in all dealings with the Federal Superfund. In that meeting, it became clear that DOHS was ready to assert itself in that role. In his notes of that meeting, Jim Anderson reports, "DOHS must review any alternative action and decide if work will (a) be sufficient to protect public health, and (b) protect the environment before any State request can go forward to EPA. (Note: If DOHS disagrees with EPA on alternative analysis, the State may not receive Federal funding and must do work without Federal Superfund.)"[16]

---On May 13 of 1982, David Mowday , the Superfund Coordinator for EPA Region 9, writes to Dr. Robert D. Stephens, the new head of DOHS's Toxic Substances Control Division. Among other activities, Stephens has responsibility for Tom Bailey's unit, the Site Cleanup and Emergency Response Section. The letter says, "Region 9's funding requests for the Iron Mountain Mine and Stringfellow sites have been delayed pending certain decisions by the State. In view of these continuing delays, I must emphasize that competition at the national level for the limited Superfund money underscores the need for the State to arrive at timely decisions with respect to these two sites... the resolution recently adopted by the Regional Water Quality Board requested that the Department make a final decision on the cost-effective remedial measure. While delaying the funding request, we had been assured by the Department that its review of the full range

of project alternatives would lead to the selection of the preferred State alternative within as short time frame."[17] It is clear that EPA is pressuring DOHS now, but also using the Regional Water Board's anxiety to gang up on Bob Stephens. It is to his credit that he was willing to hold off a quick agreement to look over a "full range of project alternatives".

---On May 20th of 1982, Bob Stephens received a letter from Michael Belliveau of Citizens for a Better Environment, expressing concern over the various remedial activities taking place at Stringfellow. The letter says, "The last line of defense in preventing further off-site contaminants is downstream extraction wells for removal of contaminated groundwater. Extraction wells will be used in place onsite to remove hazardous waste leachate. It is unlikely that these wells will provide total containment or removal of subsurface contaminants. Dr. Stierman (of UC Riverside) estimates that 'simple pumping will extract at most 40 to 50% of the fluids in these rocks.' Given the imcomplete understanding of groundwater movement in the area, there can be no guarantee that downstream movement of the plume of contaminants will be completely halted."[18]. The reply to this letter from DOHS does not discuss the fractured bedrock. It simply states that the cleanup plan calls for an additional extraction well.

---A letter from Stephens to Mowday is dated June 9, and sets a timetable to make a finding of a cost effective alternative. It

sets aside June 15 for conferring with the community. Scrawled across the top, under the approvals of the various managers over the staff person who drafted the letter are the words "Washington pressure". The letter states that augmenting of the cap through several addition measures will constitute "final mitigation". Total removal of the wastes is not mentioned anywhere in the letter. [19]

---That same day, June 9th, I talked with Bob Stephens on the telephone. My letter of June 13th recounts our conversation. It says, in part, "I was delighted to talk to you on the telephone last Friday, and I was heartened to hear that the process for formulating a remedial action plan on Stringfellow, for submittal to EPA is still 'wide open' (in your words) and that no decisions have been made. I am also heartened that we are in agreement on the importance of public input into the remedial action planning process, especially input from the Glen Avon community. However, I am concerned that the timeline for the planning process is not designed to allow for meaningful public input. Tom Bailey has told me that Region 9 has been constantly pressuring him to produce an action plan as quickly as possible. Mr. Bailey went so far as to say that Region 9 has implied that CERCLA funds will be lost to Stringfellow if the action plan is not produced very soon."[20] The letter requests that we be allowed to participate in formulating the remedial action plans, and to that end, DOHS must provide us with the funds for an independent technical advisor. We expressed the concern that the rush to complete a request to EPA would cause

the "train to leave the station before we even learn the departure time."

---A subsequent letter from me, dated June 15th, calls for the cost of cleanup to be billed to the industries responsible for the wastes at Stringfellow as a means of financing the cleanup. Looking through the files available to me, this is the first time recovery of costs of cleanup from the responsible parties is discussed. Later, EPA uses this as an excuse for delays in reimbursing the State for money's expended in the interim abatement. At this point, I was not suggesting lenghty delays, but expected the cleanup first, and the legal actions later.[21]

---At about this point, Tom Bailey visits a meeting of Concerned Neighbors and tells us that total removal is still being evaluated as an option for final solution to the Acid Pits.

---EPA files contain a memo dated 7/17/82. It is from Rene Fuentes of the Office of Technical and Scientific Assessment and it is directed to William Hedeman, Director of the Office of Emergency and Remedial Response. It evaluates the various reports of consultants regarding the site, but, again, contains no record of criticisms directed toward those reports. It also fails to mention the existence of synthetic organic chemicals on the site. Not surprisingly, it finds that the cost effective solution is the interim abatement measures already completed.

---An August 4th letter from David Mowday to Bob Stephens mentions some surprise regarding a request from DOHS for feasibility studies of additional measures at the site, and indicates that concurrence is required from EPA headquarters. Mowday states that EPA will "support this proposal, if these alternatives will: (1) provide increased realiability for elements of the on-site containment program; (2) cause minimal disturbance of current site conditions, including the clay cap;..."[23]. It is clear that EPA is now telling the State that the clay cap is adequate, and entirely adequate to remedy any threat from the site. The threat is that, if any damage occurs to the cap, or it is disturbed because of a concern that DOHS may have that more wastes, particulary the "unneutralized" wastes (totalling 25% of the entire volume) must be removed, then EPA will withdraw its funding.

---At this point, reconstructions in the press tell us that Anne Gorsuch has decided to delay the award of cleanup funds for the Acid Pits. Certainly there is less correspondence between the State and EPA. The $6 million dollars being withheld, was not for cleanup at the site, however, and would only have reimbursed the Regional Board for work completed. What seems likely is that Anne Gorsuch, on her way to California to make the presentation of the funding, noticed that Bob Stephens was unwilling to make a strong determination that the work completed was adequate to protect the public health. His inconsistency and push for further investigations at the site may have caused her to feel she was walking into a trap set by the Brown administration, who

could, with some merit, demand that EPA fund total removal. Instead, she returned to Washington, DC, where she made statements that she was going to wait until after the elections to hurt Jerry Brown's election chances.

---In late August, 20 members of the community and I traveled to Sacramento demanding a meeting with Bob Stephens. He assured us that he was sympathetic to our concerns and would continue to keep all remedial options open for consideration.

---On November 17th, 1982, Tom Bailey sends a memo to Beverlee Myers, the Head of DOHS. It is not signed or approved by Bob Stephens. It says "Total removal of the waste has been determined to be not cost effective and is not included in Track III."[25] This is at complete variance with what we were being told at this time. It also takes place without the public participation process we were promised.

---On January 27th of this year, the Department of Justice, EPA legal staff for Region 9, the California Attorney General's Office and DOHS legal staff met with various representatives of corporations responsible for dumping at Stringfellow to discuss their liability in the cost of cleanup at the Site. Although I had requested that I be allowed at the meeting, I was excluded. I was extremely concerned that the potential settlement that was discussed in the secret meeting might include a specific method of mitigation. If this were to happen, the industries

responsible for our situation would have been granted a larger say in the final decision, for better or worse, than the community who would have to live with the consequences.

After meeting with the attorneys for these corporations, several of the government prosecutors met with me in the class room where I teach, not far from here. I expressed my concerns. Michael Green, the lead attorney for the governemnt agencies (he is with the Department of Justice's Lands Division) specifically assured me that the method of final mitigation at the site was not being discussed, and that the discussions centered on the liability of the companies and their share in the cost of cleanup.

Yet, on March 4th of this year, I met with William Billingsley of the Rohr Corporation, one of the largest of the responsible parties. He told me that there three areas of discussion: their liability, their share of the cost, and the final cleanup method. I was horrified to hear that a government prosecutor had lied to me, and that I was informed by one of the parties with the largest risk of legal involvement in paying the cleanup.

---Subsequent to this episode, heavy rains washed away the cap, exposing the chemicals. Surface runoff from the site was measured and found to be highly acidic. Of special concern to us was the fact that runoff directly below the dam under the site was mildly acidic, while yards below that, the wastes were highly acidic, indicating substantial migration of wastes under the augmented clay barrier. It seems clear that our concerns about

the ability of the cap to withstand heavy rain were correct.

---"The Draft Scope of Work for the Feasibility Studies at the Stringfellow Site" was released to us for our comments on 3/4/83. True to his promise, Bob Stephens had included a full range of remedial options, including total removal.[25] Presumably, EPA was not in a position to dictate the terms of a Cooperative Agreement to the State of California, due to the recent scandals.

---On April 13, 1983, Bob Stephens was removed from his post as the Director of the Toxic Substances Control Division.

NOTES

1. 1/1/73 Report to Stringfellow Quarry Company on Industrial Waste Disposal Neste, Bruin and Stone, Civil Engineers
2. 7/8/80 Meeting notes of participant, Toxic Substances Coordinating Council, relating to report by Jim Anderson on Stringfellow site.
3. 1/23/79 Letter from Congressman George Brown to James Anderson, SARWQCB
4. 12/1/79 Report on the Stringfellow Class One Disposal Site, James M. Montgomery, Consulting Engineers
5. 5/28/80 Statement of Paul Blanc, MSPH, representing the CED Cancer Project before the State Water Resources Control Board
6. 7/2/80 Statement of Allegra Hamman, representing the CED Cancer Project before the Regional Water Board
7. 7/2/80 Resolution No. 80-142 California Regional Water Quality Control Board, Santa Ana Region
8. 10/80 Stringfellow Hazardous Waste Disposal Site Interagency Status Report
9. 10/5/81 Status of Stringfellow's Closure Progress EPA Region 9 Staff Memo to David Mowday, Superfund Coordinator, EPA Region 9
10. 11/12/81 Letter from Governor Edmund G. Brown to EPA Administrator Anne Gorsuch
11. 11/17/81 EPA Record of Communication - phone call from Keith Takata, EPA Region 9 to John Boss, DOHS
12. 12/10/81 EPA Record of Communication - phone call from Keith Takata, EPA Region 9 to Wade Cornwell, DOHS
13. 12/1/80 Engineering and Economic Evaluation of Transfering Waste from the Stringfellow Class I Disposal Site, James M. Montgomery, Consulting Engineers
14. 12/18/81 Request for Funding for Stringfellow Site, Riverside, CA memo from David Mowday, Superfund Coordinator, EPA Region 9, to William N. Hedeman, Director, Office of Emergency and Remedial Response
15. 1/11/82 EPA Record of Communication - Phone call from Paul Nadeau to EPA Region 9 staff regarding Stringfellow fact sheet-Funding Request

16. 4/5/82 Stringfellow Alternative (Cost-Effectiveness) Internal Memo from Jim Anderson to Regional Board members
17. 5/13/82 Letter from David Mowday to Robert D. Stephens, Director, Toxic Substances Control Division, DOHS
18. 5/20/82 Letter from Michael Belliveau, Citizens for a Better Environment, to Robert D. Stephens
19. 6/9/82 Letter from Robert Stephens to David Mowday
20. 6/13/82 Letter from Penny Newman, Chair, Concerned Neighbors in Action, to Robert Stephens
21. 6/15/82 "same"
22. 7/17/82 memo from Rene Fuentes, Office of Technology and Science Assessment, EPA HQ to William Hedeman, regarding Review of Closure Plans for Stringfellow Site
23. 8/4/82 Letter from David Mowday to Robert Stephens
24. 11/17/82 Memo from Site Cleanup and Emergency Response Section (Tom Bailey) to Beverlee Myers, Director, DOHS
25. 3/15/82 Stringfellow Facility - Draft Scope of Work for Feasibility Study
26. 4/4/83 Memo from Office of Programs and Policy Development staff to OPPD Chief, Toxic Substances Control Division, DOHS
27. 6/9/82 Letter from Kathy Newman of the Enviromental Defense Fund to EPA Administrator Anne Gorsuch. The letter is signed by representatives of 22 community groups organized at Superfund cleanup sites.

A8 Los Angeles Herald Examiner, Wednesday, April 20, 1983

A toxic gift for state chief of 'superfund'

Angry East L.A. residents send Capri dump soil back to capital

By Paul Wilner
Herald staff writer

Angry East Los Angeles community members presented state toxic waste "superfund" director Thomas Bailey with a to-the-point souvenir last night: some contaminated soil from the controversial Capri Pumping Service.

At a meeting at Our Lady of Talpa Church in Boyle Heights, United Neighborhoods Organization leaders Father Pedro Villaroya, Loretta Hernandez and Diane Tarango blasted the state health department for failing to act more quickly to clean up Capri and blamed the delays on Bailey's administration.

"This is some toxic soil we took from the Capri site earlier today," Hernandez said, ceremonially. "We want you to take this can with you to Sacramento and put it on your desk. We want you to remember that it's toxic, and that the longer it sits on your desk, you may get sick ... like the thousands of people (living near) Capri."

Former Gov. Jerry Brown signed the state superfund legislation at the Capri site on Sept. 24, 1981, promising to clean up "this kind of toxic mess and send the polluters the bill."

Brown returned a year later, allocating $1 million in emergency funds, and on Dec. 31, 1982, Beverlee Myers, his state health director, sent a letter authorizing a contract between the state and the city to clean up Capri.

But there continue to be contaminants on and off the site.

Last night, Bailey, whose administration also has been criticized as lethargic by community activists at the Stringfellow acid pits near Riverside, blamed the delays on negotiations with "responsible parties" who dumped at the site and on legal problems preventing the state from entering the site.

He expressed "the intent" the state would have a cleanup contract with the city by June, and have Capri cleaned up three months later.

"We will have on June 1 a contract to start the cleanup and within three months after that, the problem will be resolved," Bailey said, but left himself a legal escape clause if the state is unable to gain access to the property.

"This present administration is not making promises that they can't uphold," he added, in an apparent dig at the commitments made during Brown's tenures. Several other state health department sources have said that Bailey's cautious policies have been one of the major problems preventing Capri from being cleaned up.

Hernandez confronted Bailey about why the state had not cleaned up contaminants, including zinc, copper, lead and cyanide, registered on public property adjacent to the site.

The superfund director ducked the question, saying he hadn't had a chance to review the data.

"Off site, I can't tell you that it (the cleanup) hasn't been done," Bailey said. "The data presented this evening is about seven weeks old, and I don't know that the contamination still exists today." The state superfund director said he was not denying that the area near Capri was contaminated, however, adding that he didn't know what chemicals remained there.

Hernandez praised Bailey's proposed cleanup plan, which has elaborate precautions to protect those who will be removing the toxic chemicals from Capri.

Governor makes a vow to enforce environmental laws 'to the letter'

SACRAMENTO (AP) — Denying reports that he will ease enforcement of anti-pollution laws, Gov. George Deukmejian promised yesterday that his administration will enforce environmental statutes "to the letter."

The Republican governor told a convention of some of California's most powerful industrial leaders that they are "badly misinformed" if they believe he will compromise environmental laws to attract new industry. He said he is particularly concerned about disposal of toxic wastes.

"I know there have been some concerns expressed that our efforts to put some common sense into the regulatory process somehow signal a retreat from essential health and safety standards," Deukmejian said in a speech to the California Manufacturers Association annual convention.

"If there are companies who think they will be able to do business in our state and treat our environment in an indifferent or harmful manner, they're in for a rude awakening," Deukmejian said. "The environmental laws of this state will be enforced to the letter under this administration."

Ms. NEWMAN. I have with me Michael Belliveau, who is from the Citizens for a Better Environment, who has been on the State Siting Council with Assemblywoman Sally Tanner, has participated in many aspects of the hazardous waste issue here in California and has reviewed many of the reports that Department of Health Services and EPA base their information on and he will be addressing any technical issues for me.

Are there any questions?

Mr. BROWN. Ms. Newman, we are going to ask Mr. Johnson to present his statement next and then if there is any time remaining, we will have questions of all of the witnesses.

Ms. NEWMAN. OK. Fine.

STATEMENT OF CECIL JOHNSON, PARENTS OF JURUPA, INC., GLEN AVON, CA

Mr. JOHNSON. Thank you, Ms. Newman. It makes me happy that she is on my side because she is a former student of mine who made an "A."

My name is Cecil Johnson. I am representing the Parents of Jurupa. I am associate professor of biology at Riverside City College and it seems since about 1956 when the dumps opened the philosophy of many governmental officials, not all, both State and countywide, has been if it leaks, so what, and that is really what she has been saying that the attitude has been.

Now, one thing I would like to mention before I begin here—and I will read mine rather rapidly as it is not very long because she has covered most of the pertinent points—is that I would like to say who has been behind the work to get this dump closed almost since it opened in 1956, Mrs. Ruth Kirkby of Glen Avon, CA. [Applause.]

In fact, she has trunks of documents that she has taken out of waste baskets that officials have seen fit, some of them have seen fit to not want her to see. She knows that tapes have been destroyed and so forth and so on. You know these things. But I would call Ruth Kirkby, because I am merely using her words—I am just her spokesman and for the people out here, hopefully—that I would like to call Ruth Kirkby the Rachel Carson of California. [Applause.]

And with these two ladies working together and the others, I don't see how we can't get the necessary help.

I would just like to do a brief chronology here, not only for you but for the people out there.

June 1955, proposal to locate industrial waste Stringfellow site. Quote from the State engineer, "Since proposed site is underlaid by impermeable rock, operation will not constitute a hazard to waters of state if surface runoff is not allowed to carry waste into runoff or drainage channel." That was Edmonston, State engineer, 1955. Quote from him, "Provision must be made to assure if runoff occurs it does not run into ground waters of the Chino basin." Chino basin provides drinking water for hundreds of thousands of people in the fastest growing counties in the United States, Riverside and San Bernardino Counties.

In the 1960's Parents of Jurupa used the definition put down by the Secretary of State of California, "Toxic means lethal, injurious to man and other living organisms, domestic animals and wildlife." Parents of Jurupa received threats from Stringfellow lawyers that what they were saying was libelous when they held an open meeting and that they should discontinue their protests. The Parents of Jurupa then incorporated. The battle lines were drawn.

In 1972, the Stringfellow acid pits were closed. In 1973, report from Mr. Stringfellow's engineers, Neste, Bruden, and Stone stated, quote—his own engineers—"Exact nature of discharged toxic waste of load discharge unknown." Quote, "Once a class of toxic wastes was approved and accepted, no further checks were made on that producer company." The gate at Stringfellow pits was open 24 hours a day for all dumpers. Since there were no guards or locked gates, the hauler left a written notice of the quantity of waste dumped at the office or in a locked box if he arrived after normal working hours. Can you believe that?

The dumping company was honor bound not to dump certain organics like DDT, which Montrose Chemical Co. did dump. Children, domestic animals, wildlife roamed at will in and around the pits. In 1974, State engineer, reiterating the words of Mr. Anderson, "If it leaks, so what?"

February 2, 1978, Parents of Jurupa, Inc., with the aid of Congressman Brown's office, sent a sealed water sample from the pits to Colorado for analysis. Remember, this is 1978. This sample was found to contain at least 24 organic compounds, which Ms. Newman has already mentioned. The findings were presented to California's Hazardous Materials Management in February 1979. In a panic the California Hazardous Materials Management Section followed up with their own analysis which also pointed out rather sizable amounts of DDT were present at the Stringfellow site.

From 1955 to 1983 the Parents of Jurupa, given the runaround by James Anderson, executive director of the Santa Ana Regional Water Control District, who, when told to test for certain organics—these are all documented—in a letter from the State of California, Department of Water Resources, directed his workers in the margins of the document, which you have there today, not to perform those tests of the chemicals which are now coming down into the citizen's yards and schools in Glen Avon, CA.

In 1978, because of heavy rains at the site, James Anderson directed that 1 million gallons of wastes be released into the community of Glen Avon. This was near the Glen Avon Elementary School which 670 students then attended. This was done in complete disregard to what he knew about the poisons.

In 1978, Dr. James Hammond, sitting next to me here, in a letter to Ruth Kirkby, Parents of Jurupa, Inc., quote:

> According to records I have seen, the exact composition of the materials dumped into the site was not known, although at least one carcinogenic material, hexavalent chromium, was reported to be present in measurable quantities. Aside from its carcinogenic nature, hexavalent chromium is also reported to be lethal to humans when taken orally if enough of the water is drunk.

39-743 0 - 85 - 4

March 1983, Dr. Stierman, who will be on to give his check on hexavalent chromium so I will not read this, because he will cover that.

In 1983, Parents of Jurupa had water tested from the overflow into the community by Anachem Laboratories in Los Angeles, CA, via the techniques utilized in most universities, which revealed an alarming array of heavy metals, some of which are involved in deactivating human enzyme systems causing brain disorders, epilepsy, and birth defects in humans and wild animal populations.

April 1983, Dr. Robert Stevens was pulled off the case by Governor Deukmejian and reassigned to another position. Other than the dedicated California Senator, Robert Presley, who has been most helpful to the Parents of Jurupa in California—I think Congressman Brown and Senator Presley have really shown their concern for the people of Glen Avon. [Applause.]

Dr. Stevens, who was removed here, was a driving positive force for the Parents of Jurupa and will be sadly missed.

Now, for the solutions and then I am nearly through, the solutions which we propose:

One, the congressional committee to direct the Environmental Protection Agency to allocate funds to legitimate leaders in this community in the form of a trust so the State will not be able to divert these funds from their legitimate purpose for which they are intended.

Two, a team effort for the resolution of decontamination procedures at or near the site and around the people of Glen Avon's homes, which will require much work by this team, which will consist of geologists, hydrologists, chemists, engineers, citizens, and ecologists.

Three, discontinue hauling toxic wastes from one site to another.

Four, fence off the entire canyon and post 24-hour guards.

Five, the State should purchase all the 300 or 400 acres in this general area. [Applause.]

Six, draw up plans for a research station for onsite decontamination. The people, I think, are saying that we want it here in our own community. We have a community of scientists around Riverside and San Bernardino. We can do it here. We can put it in tanks and detoxify it because hauling it to another place is merely taking one community's problems and dumping it in the laps of another community. [Applause.]

Last, but not least, fire James Anderson [applause] for being obviously derelict in his duty to protect the drinking water of the people of Glen Avon and in the future the larger population of southern California, who receive part of their drinking water from the Chino Basin, which supplies all of Orange County with their water. This is a very large problem, which we are facing here.

I thank you and I can tell the people on the committee that you have listened to what we have said. I would like to introduce Dr. Chapman, who would also like to add, after Mrs. Penny Newman. Thank you very much. Excuse me. That was Dr. James Hammond. I am sorry.

[The prepared statement of Mr. Johnson follows:]

The Subcommittee of the House Committee
on Science and Technology, and the California
State Assembly Committee on
Consumer Protection of Toxic Materials

The job which we must address ourselves to is saving the community from further poisoning and immediately laying down plans for decontaminating the soil and water...
Parents of Jurupa, Inc.

To: Honorable George Brown
From: The Parents of Jurupa, Inc.

June, 1955..Proposal to locate industrial waste Stringfellow site.
"Since proposed site is underlaid by impermeable rock, operation will not constitute a hazard to waters of state if surface run-off is not allowed to carry waste into run off or drainage channel"..Edmonston, State Engineer. "Provision must be made to assure if run-off occurs it does not run into ground waters of Chino Basin." Chino Basin provides drinking water for hundreds of thousands of people in the fastest growing counties in the United States: Riverside and San Bernardino Counties.

1960's..Parents of Jurupa used the definition: "Toxic means lethal, injurious to man and other living organisms, domestic animals and wildlife." Parents of Jurupa received innuendos from Stringfellow lawyers that what they were saying was libelous and they should discontinue their protest. "The Parents of Jurupa" then incorporated. The battle lines were drawn.

1972..Stringfellow pits were closed.

1973..Report by Neste, Bruden and Stone stated, "Exact nature of discharged toxic waste of load discharge unknown." "Once a class (of toxic wastes) was approved and accepted no further checks were made on that producer (company)." The gate at Stringfellow pits was open 24 hours a day for all dumpers. Since there were no guards or locked gates the hauler left a written notice of the quantity of waste dumped at the office or in a locked box if he arrived after normal working hours. The dumping company was honor bound not to dump certain organics like DDT which the Montrose Chemical Company did dump, Children, domestic animals, wildlife roamed at will, in and around the pits.

1974..State Engineer Bob Fox was still saying,.."if it leaks, so what?"

Feb. 2, 1978..Parents of Jurupa, Inc. with the aid of Congressman Brown's office sent a sealed water sample from the pits to Colorado for analysis.*1 This sample was found to contain at least 24 organic compounds such as Methylene chloride, Chloroform, trichloroethylene, etc. Findings were presented to California's Hazardous Materials Management in Feb. 1979. In a panic the California Hazardous Materials Management Section followed up with their own analysis which also pointed out rather sizeable amounts of DDT were present at the Stringfellow site.

1955 1983..Parents of Jurupa, Inc. given the run-around by James Anderson, Executive Director of Santa Ana Regional Water Control District, who, when told to test for certain organics in a letter from the State of California, Department of Water Resources, directed his workers not to perform certain of those tests. *2.

1978.. Because of heavy rains at the site, James Anderson directed that 1,000,000 gallons of wastes be released into the community of Glen Avon. This was near the Glen Avon Elementary School which 670 students attended. This was done in complete disregard to what he knew about the poisons.

1978..Dr. James A. Hammond in a letter to Ruth Kirkby, Parents of Jurupa, Inc. stated, *3 "According to records I have seen, the exact composition of the materials dumped into the site was not know, although at least one carcinogenic material (hexavalent chromium) was reported to be present in measurable quantities. Aside from its carcinogenic nature, hexavalent chromium is also reported to be lethal to human when taken orally, as by drinking contaminated water."

March, 1983..Dr. Donald Stierman, Department of Earth Science, University of California, published his paper, "Stringfellow Fracture Study, Quantitative Contamination Analysis." "Chromium in cracks."*4 Chromium, a heavy metal, is a known carcinogen and was found down at a depth of 199 feet. His objective was to determine to what depths the fluids(wastes) had penetrated in the fractures in the granite. Professor Stierman is a national authority on granitic rock.

April, 1983..Parents of Jurupa, Inc. had water tested from the overflow into the community by Anachem Laboratories in Los Angeles, California, via atomic absorption spectroscopy which revealed an alarming array of heavy metals, some of which are involved in deactivating human enzymes systems causing brain disorders, epilepsy and birth defects in humans and wild animal populations. *5

April, 1983.. DR. Robert Stevens was pulled off the case by Governor Deukmajian and reassigned to another position. Other than the dedicated California Senator Robert Presley who has been most helpful to the Parents of Jurupa, Inc., Dr. Stevens was a driving positive force for the Parents of Jurupa, Inc.,and will be sorely missed .

3.

Solutions

1. The Congressional Committee to direct the E.P.A. to allocate funds to legitimate leaders in the form of a trust so the state will not be able to divert these funds from their legitimate purpose for which they are intended.

2. A team effort for the resolution of decontamination procedures at or near the site will require much work by this team which will consist of geologists, hydrologists, chemists, engineers, citizens and ecologists.

3. Discontinue hauling toxic wastes from the Stringfellow site to Covina.

4. Fence off the entire canyon and post 24 hour guards.

5. The State should purchase all private land in the general area.

6. Draw up plans for a research station for on-site decontamination.

7. Fire Mr. James Anderson for being obviously derelict in his duty to protect the drinking water of the people of Glen Avon and in the future the larger population of Southern Californians who receive part of their drinking water from the Chino Basin.

Respectfully submitted,

Parents of Jurupa, Inc.

Cecil E. Johnson, Presentor
Associate Professor of Biology,
Riverside City College
Riverside, California

Documents referred to in text:

*1 Laboratory Report, Hazardous Materials Laboratory, Division of Laboratories, Colorado Department of Health.

*2 Memorandum to California Regional Water Quality Control Board, Attention: Mr. James Anderson, Executive Officer, with notations on margins.

*3Letter to Ruth Kirkby, Secretary, Parents of Jurupa, Inc., from James A. Hammond, consulting chemist.

*4 Paper titled, Stringfellow Fracture Study, Quantitative Contamination Analysis, by Dr. Donald J. Stierman, Assistant Professor of Geophysics, Department of Earth Sciences, The University of California

*5 Analysis report to Patrick Wall from the Anachem Laboratories, testing the liquid sludge.

Every Test Known To Man Alphabet

To Congressman Brown
To Colorado
Sent 1978 (10-13)
Results Feb 1979

#1

LABORATORY REPORT

Hazardous Materials Laboratory
Division of Laboratories
COLORADO DEPARTMENT OF HEALTH

TO: Bill Dunnill FROM: C. E. Lott, Jr.

SUBJECT: GC MS Identification of Organic Compounds

INTRODUCTION

On October 13, 1978 a sample of a dark liquid was submitted to the Laboratory by Mr. W. S. Dunn for the identification of the organic compounds present therein. The sample was logged and assigned the lab #78081. The sample consisted of a volume of approximately a quart and was contained in a glass jar with what appeared to be a teflon liner in the cap.

SUMMARY

1. The oil was found to contain at least 24 purgeable organic compounds.

2. These compounds were identified by GC MS as being present in the oil were: METHYLENE CHLORIDE, CHLOROFORM, BENZENE, TOLUENE, TETRACHLOROETHYLENE, CHLOROBENZENE, ETHYL-BENZENE, the three isomers of XYLENE, CUMENE, at least two isomers of TRICHLOROBENZENE, CYMENE, AND NAPHTHALENE.

3. There remain several unidentified organic compounds in the sample at very low levels of concentration.

4. The levels of the purgeable organics fell within the approximate ranges of less than 1 PPM to greater than 30 PPM.

5. Compounds at the higher concentration levels were TRICHLOROETHYLENE, CHLOROBENZENE, the XYLENE isomers, and the two isomers of TRICHLOROBENZENE.

6. Two basic extraction attempts were made to extract the base neutral compounds and the acid extractables but the formation of a thick gel precipitate and an emulsion prevented an adequate extraction to be made.

EXPERIMENTAL--

Volatile Compounds:

The volatile compounds were purged from a 10 ml sample with a stream of helium (30 ml/min) onto a porous polymer trap. The trap (6 inch by 4 inches) was held at room temperature during purge and trap operations (20 minutes). The trap was then attached to the mass spectrometer and heated to approximately 200 deg-C for 1 minute and the trapped compounds injected into the GC/MS. The GC/MS analytical column (SP-2100) was temperature programmed from 10-75 deg-C at 5 deg-C/min. The mass spectrum of each component was obtained as each eluted from the column.

The spectra collected were then compared both manually and by computer techniques with a reference library collection of approximately 8,000 authentic spectra. Those compounds identified are given in the summary.

Base-Neutral Compounds:

The sample was adjusted to pH 11. This adjustment resulted in the formation of a heavy flocculent precipitate. Attempts to extract the sample resulted in emulsions which were found to be very stable. No suitable means was found to break the emulsion.

Acid Extractable:

The sample was then adjusted to pH 2 and another extraction was attempted. The extract was concentrated and examined by GC/MS. No significant levels of organics were found.

DISCUSSION -

The analytical schemes used in this investigation are those proposed by the EPA. As the laboratory observations would suggest, the schemes for the extraction of the organics will require further laboratory evaluation and refinement for use on samples of this character. It should be pointed out that even though there were no organics observed in the acid-extract this does not the absence of organics of this class cannot be shown due to the possible adsorption on the precipitate in the base-neutral operation.

The levels of the organics found in the purge operation are valid only for the point in time that the sample was actually sampled for analysis. It is a well known attribute of organics at low levels in water to undergo changes in concentration due to losses through the sealing cap, adsorption on the container walls, etc. Therefore, it would be a reasonable assumption that the sample actually contained higher levels of organics at the point of field sampling than was observed in the laboratory. It was observed in the laboratory that upon each sample removal from the sample container that the organic level had fallen significantly.

The mass spectra are available for review if desired.

C. E. Lott, Jr.
Public Health Chemist

This report prepared 11/6/78.

State of California — The Resources Agency

Memorandum

To : California Regional Water Quality Control Board
Santa Ana Region
6809 Magnolia Avenue, Suite 14
Riverside, CA 92506

Attention: Mr. James W. Anderson
Executive Officer

Date : JAN 5 1973

File No.: 240.82

Subject: Stringfellow Class I Disposal Site; Possible Monitoring Program

From : Department of Water Resources
Los Angeles, CA 90053

In accordance with Mr. Richard A. Meermann's telephone request of December 11, 1972, Mr. Sanford Werner, Associate Geochemist, inspected the subject site on December 14. He met Mr. Stringfellow there. They discussed possible monitoring points and the reported threats of ground water degradation from the disposal facilities. Possible degradation has been indicated in Well No. 2S/6W-16Q1 by the increase in NO_3 and TDS concentrations from 17 mg/l and 520 mg/l, respectively, in April 1966, to 300 mg/l and 1,865 mg/l, respectively, in December 4, 1972, and hexavalent chromium concentrations of 0.05 mg/l on October 4, 1972, and 0.07 mg/l on December 4, 1972.

The inspection team's report on the geology, hydrology, and water quality aspects of this site is its memorandum of June 7, 1972 (attached).

Based on information obtained from that inspection and from our files, we suggest the following monitoring program for evaluating the quality of ground water near the Stringfellow waste discharge facilities:

1. Measure water levels and obtain chemical analyses, including ammonium ion (NH_4) and heavy metals for all available wells (about 5 wells) in "Pyrite Canyon" drainage, north of State Highway 60 (Mission Boulevard), and selected wells south of Highway 60.

2. Obtain complete chemical analyses of wastes in disposal ponds, including NH_4 and heavy metals.

3. Analyze wastes in disposal ponds for exotic toxic and hazardous wastes, which a review of disposal records indicates, have been discharged into the ponds.

4. Analyze downstream wells north of State Highway 60 for similar constituents found in analyses under Item 3, above.

5. Collect soil samples from shallow test holes of various depths in the wash, downgradient from the munitions facility and analyze them for at least NH_4 and NO_3 ions.

6. Collect soil samples from various depths around Stringfellow's Well No. 2S/6W-16Q1 to evaluate the possible influence of wastes leaking (at least NH_4 and NO_3 ions) into the well. (A corral is near that well.)

JAN 6 1973

SANTA ANA REGION

JAMES A. HAMMOND
Consulting Chemist
1010 PACIFIC ST.
REDLANDS CA. 92373
(714) 792-0591

#3

September 4, 1978

Mrs. Ruth Kirkby, Secretary
Parents of Jurupa, Inc.
7581 Granite Hill Drive
Riverside CA 92509

Subject: Toxic wastes from the Stringfellow Class I dumpsite.

Dear Mrs. Kirkby:

I have been interested in your group's efforts to have the Class I dumpsite above Glen Avon cleaned up for several years and have previously recommended a course of action for determining the extent of pollution of the basin below the site and for abatement/decontamination at the site and ground water below the site. The distribution of the contents of the dumpsite over the Pyrite Basin and Glen Avon during the Spring rains has greatly multiplied the problem. According to the records I have seen, the exact composition of the materials dumped into the site was not known, although at least one carcinogenic material (hexavalent chromium*) was reported to be present in measurable quantities.

Aside from its carcinogenic nature, hexavalent chromium is also reported to be lethal to humans when taken orally*, as by drinking contaminated water. I have taken the liberty of constructing a table showing the number of glasses of water a person would need to drink to get a lethal dose, or by extrapolation, a toxic dose, which I am including at the end of this letter. While it is improbably that a person could (or would) drink enough contaminated water at one time to exceed the low lethal dose at low contamination levels, in the 1000-2000 ppm range, a person could easily exceed the low toxic dose (extrapolated) limits. I drink about 20 cups of liquid a day, mostly water, and it is not unusual to have 3-5 cups of coffee with a meal. The short term effects are listed as neoplastic - i.e. tumors may be produced.

In addition to chromium, I suspect that there are dresols and phenol present. (I should like a chemical analysis to determine this absolutely.) The reported low lethal doses and low toxic doses for phenol are 140mg/Kg. and 14 mg/Kg. body weight of a human when taken orally. This is 1/3 of the dose for hexavalent chromium, and the values in the table can be divided by 3 for water contaminated by phenol. The lethal dose for a

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* The Toxic Substances List, 1974 Edition, H.E. Christensen, T.O. Luginbyhl, Eds., U.S. Department of Health, Education and Welfare National Institute for Occupational Safety and Health, Rockville, Md.

baby is now within probability when the phenol concentration is above 2000 ppm. The lethal doses for the cresols are reported to be about ½ that for phenol.

Air-borne phenol and cresol vapors are also toxic. The U.S. Occupational Standards for phenol and cresol vapors is a time-weighted average (usually in an 8-hour work day) is 5 ppm. However, these vapors can be absorbed through the skin, and the additional exposure through the skin may be dangerous.

The preceding arguments are made to show that more immediately toxic materials than hexavalent chromium may be present in the overflow from the Stringfellow site. The effects of long-term, low level exposure may produce other as yet undefined problems. Therefore, until complete chemical analysis shows otherwise, the overflow material must be treated as the most dangerous case. In my opinion, no water in the basin should be consumed or dirt moved (dust spreading) until the hazard is determined is be less than the lower limits established by the EPA.

This brings up the next subject: determination of the extent of contamination. If I were responsible for determining the contamination present in the basin and the canyon, I would do the the following:

1. Determine the nature of the contaminants. A complete chemical analysis for all materials (major, minor and trace) present in the waste at the dumpsite and at several selected sites downstream. This latter would include core samples to bedrock and well water samples. These samples would be compared to samples taken from similar geological formations in the immediate, uncontaminated area.

2. Determine the boundaries (and concentration contours) of the contaminants from the site. This would require possibly hundreds of core samples (to bedrock).

3. Determine the effect of the contamination on the Pyrite Basin water - how long to leave, how high contamination levels get before abatement.

4. Recommend decontamination procedures. Soil may need to be replaced, possibly some materials could be removed and recovered, other materials may be neutralized or immobilized. The dumpsite may be emptied and decontaminated. Any useful action must be based upon a knowledge of the exact nature and extent of the problem.

I hope that the foregoing may help you to come to a solution of the problem that exists because of the Spring floods and run-off from the Stringfellow site. I shall be pleased to aid in the solution of the problem in any manner within my capability.

Sincerely,

James A. Hammond

8 oz. glasses of water to produce effect

Chromium compd. in water, ppm	Low lethal dose					Low toxic dose				
	Baby 11 lbs.	3 yrs. 30 lb.	8-9 yr. 55 lbs.	Adult 110 lb	Adult 220 lb.	Baby 11 lb.	3 yrs. 30 lb.	8-9 yr. 55 lbs.	Adult 110 lb.	Adult 220 lb.
100	100	280	500	1000	2000	10	28	50	100	200
1,000	10	28	50	100	200	1	3	5	10	20
2,000	5	14	25	50	100	½	1½	2½	5	10
10,000	1	3	5	10	20	227cc	1/3	½	1	2

Table based on NIOSH data showing the low lethal dose for humans by oral ingestion is approximately 430 mg chromium compound per kilogram (2.2 lbs.) of body weight. The low toxic dose for many substances appears to be about 1/10 the lethal dose, so this has been assumed for the table. One 8 oz. glass of water contains about 227 g. of water and at 100 parts per million (ppm), each glass would contain about 23 mg. chromium.

Chromium in Cracks - Page 1

STRINGFELLOW FRACTURE STUDY

QUANTITATIVE CONTAMINATION ANALYSIS

MARCH 1, 1983

Fractures in the crystalline rocks underlying the Stringfellow site have allowed materials disposed of in lagoons between 1955 and 1970 to diffuse at least 150 feet deep into the granitic bedrock. Although the hydrology of fracture-dominated aquifers remains a complex problem, analysis of material in and adjacent to fractures found in the rock cores collected in February, 1981, may provide a basis upon which depth of penetration under the entire site might be evaluated. Results of 42 samples collected from fractures in the bedrock are given below.

Sample Selection and Preparation

Core logs prepared by the drilling team document a wide variety of conditions in the boreholes. Bedrock grades from highly weathered to completely unweathered granite, with some dikes and inclusions of other rock types present. While fracturing decreases with depth, evidence of cracks and alteration (alteration infers some circulation of water during the geologic history of the rock) was found to depths of 199 feet. My objective was to seek clues regarding the depth to which fluids from the site have penetrated the fractures.

With permission of the State Health Department, I visited the site on February 17. I inspected core samples from 6 boreholes, selected a suite of fractures exhibiting various apertures and mineralogy, and collected about 5 - 10 grams of material from each of 42 fractures. Control samples were selected from the granitic rocks of my research collection.

Preliminary tests had shown that a weakly acid solution extracted

chromium, an exotic element characteristic of the fluid waste, more efficiently than distilled water. A 0.14 N nitric acid solution was used to extract soluble components from the 42 borehole samples and 2 controls.

New test tubes were rinsed with double distilled water and allowed to dry. The tubes were weighted first empty (with stopper). Then, a split (2 to 5 grams) of the sample was placed in the test tube and the unit reweighed. Third, approximately 5 ml of 0.14 N nitric acid as introduced to the tube and the unit weighed once more.

The samples sat for about 72 hours, with moderate agitation at irregular intervals to encourage remixing of the experimental material. The mixtures were filtered and the leachate samples delivered to atomic absorption spectrophotometer (AAS) technician Jerry Ervin for analysis.

In addition to the control samples mentioned above, blank samples consisting of extraction fluids were also placed in tubes, agitated and filtered. None of the blanks contained signifiant detectable chromium.

Concentrations of chromium measured by the AAS were normalized with respect to total fluid used to extract soluble components and with respect to the total mass of the rock in each experimental unit. Table I summarizes the results.

DISCUSSION

The amount of chromium given in Table I is far less than the bulk concentration of the rock formation. My samples were taken from the fractures, from that part of the rock most susceptable to contamination. These fractures comprise, at most, a few per cent of the total rock formation. Some shallow fractures contained virtually no chromium, which shows that some fractures are not connected with the fracture systems that reach the surface. Figure 1 displays the pattern of chromium extracted as a function of depth. An optimistic interpretation might

place the bottom of the contamination, based on the available information, at about 85 feet. However, chromium extraction exceeded 1 ppm to depths of almost 150 feet. A conservative interpretation (conservative with respect to erring on the side of risking misidentification of uncontaminated material rather than erring by failure to detect contamination where it exists), based on the evidence available, finds measurable contamination blending into background levels of extractable chromium at 150 feet under the site. Suspect material was found in fractures 100 feet or more deep in 4 of the boreholes, suggesting that these fractures are pervasive in these rocks.

Some questions remain unanswered. First, my control samples were granite rather than alteration materials from fractures. I intend to test new control samples whose mineralogy more closely matches the clay minerals selected from the Stringfellow samples for extractable chromium. I will also have the mineralogy of the samples already tested determined so as to investigate possibilities of preferential absorption/release of chromium by different minerals.

I do not have drilling logs for boreholes B-5a or B-6. If anyone reading this report knows where I can obtain copies of these logs, I would appreciate their informing me.

Donald J. Stierman
Assistant Professor of Geophysics
Department of Earth Sciences
The University of California
Riverside, CA 92521
(714)-787-3438

39-743 0 - 85 - 5

Table I

SUMMARY, CHROMIUM EXTRACTED FROM FRACTURES
STRINGFELLOW CORE SAMPLES
MARCH 1, 1983
D.J. STIERMAN - THE UNIVERSITY OF CALIFORNIA (RIVERSIDE)

Borehole	Depth (feet)		Chromium extracted (ppm)
B-5a	61		0.141
B-6	151		0.0397
B-6	139		0.0403
B-6	133.5		0.0287
B-6	127		0.00796
B-6	104		0.0123
B-6	88		0.232
B-6	72		0.158
B-5a	122		0.0246
B-5a	115		0.228
B-5a	87		0.0329
B-5a	88		0.0294
B-5a	79		57.37
B-5a	77		1.59
B5-a	140		0.142
B-3	156		0.00858
B-3	134		1.09
B-3	93		0.0214
B-3	84		4.77
B-3	62		29.73
B-3	41		5.57
B-4	147		0.123
B-4	122		0.403
B-4	107		1.68
B-4	81		0.0835
B-4	65		166.37
B-4	59		99.33
B-4	41		42.65
B-2	117		0.838
B-2	105		1.92
B-2	99		0.0960
B-2	82		0.0197
B-2	70		0.569
B-2	66		286.04
B-2	199		0.376
B-2	189		0.140
B-2	180		0.274
B-1	142		0.0229
B-1	110	(different	0.166
B-1	110	(fractures)	0.273
B-1	107		0.824
B-1	78		8.042
Control #1			0.1308
Control #2			0.00989

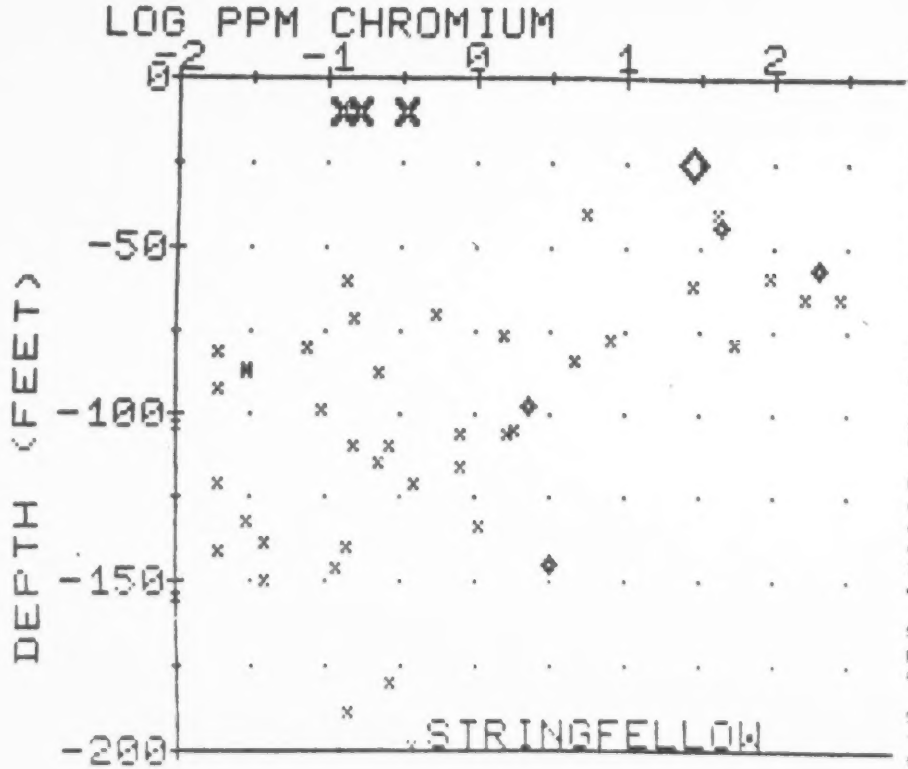


FIGURE 1

Concentration of chromium extracted from fracture fillings plotted as a function of depth. Horizontal axis values are plotted as logarithm (base 10) of mg chromium extracted per kg of sample.

Large "X" symbols show control values (measured for uncontaminated samples, including controls previously reported). One sample falls off the graph (<0.01 ppm).

Large diamond symbol shows chromium extracted from contaminated control, a rock collected from the bottom of a lagoon once filled with liquid waste.

Small diamonds show results of preliminary samples reported on previously.

Small "x" symbols show values measured in this phase of our study (new data).

(#40)

THE ANACHEM LABORATORIES

CHEMICAL - PHYSICAL - METALLURGICAL

[illegible] WEST 5TH STREET LOS ANGELES, CALIFORNIA 90062 TELEPHONE (213) 294-1282 / 292-0566

PATRICK WALL

REPORT DATE Apr. 8, 1983
LAB NO. 260-03
YOUR ORDER NO.
SAMPLE (S) sludge
RECEIVED 3-29-83

LIQUID SLUDGE (OVERFLOW FROM ACID PITS)
Tested as received

METHOD: Known volume of the sample was digested repeatedly with con. HNO_3 and con. H_2SO_4 mixture 3 times. The digest was cooled and filtered. The filtrate was restored to the original volume of the sample and then analyzed for the metals by atomic absorption spectroscopy. A separate volume of sample was analyzed for Total Cyanide.

	Cyanide, Total	< 0.01 mg/L	OSHA [illegible]
	Aluminum, Total	3.83 g/L	
	Arsenic, Total	0.02 mg/L	
	Cadmium, Total	0.48 mg/L	0.01 mg/L
over 14 times →	Chromium, Total	7.40 mg/L	0.05 mg/L.
O.S.H.A. STANDARD	Copper, Total	5.10 mg/L	1.0 " "
	Iron, Total	6.60 g/L	0.3 " "
	Nickel, Total	6.6 mg/L	
	Lead, Total	0.20 mg/L	
	Manganese	130 mg/L	
	Mercury	< 0.002 mg/L	
	Zinc	18.4 mg/L	5.0 mg/L.

I hereby certify that this report is correct to the best of my knowledge and belief.

Respectfully submitted,
THE ANACHEM LABORATORIES

V. G. Chaplo

Mr. BROWN. Dr. Hammond, we would like to hear a few words from you, if you would.

STATEMENT OF DR. JAMES HAMMOND, CORPORATE CHEMIST, COLAMCO

Dr. HAMMOND. I am bringing probably what is a hope of decontaminating the site below the Stringfellow pits themselves. As you know the problem is one of not only ground water migration and contaminated plumes, but also of the various floodings that have occurred that pushed the water and the contaminated material from Stringfellow down into the community as far as South Pedley in some of the reports I have seen.

The probabilities of cleaning up everything are fairly remote. The possibility of getting specific things done around particular places where there is the highest contamination is probably very good. The main thing that we can see at this point, other than hauling everything away, is to try to immobilize or remove at specific sites high concentrations of materials that are hazardous, either carcinogenic or otherwise.

Immobilization is a possibility. For an example, I have prepared one that is rather spectacular. You may have chromium present, hexavalent chromium, and if you add lead compounds to this, you can get lead chromate, which is essentially insoluble, as the rock around the site. The chromic acid itself is extremely soluble and over 100 percent in water. This means a chemical means for reducing the concentration of a carcinogen exists if we know enough about the surroundings to make it work. I will come back to that.

There has recently been a considerable amount of work done on catalysts to dechlorinate materials such as DDT and trichloroethylene and the other halogenated carcinogens. These offer a hope for subsurface and surface decontamination of the chlorinated materials. It won't be easy and it will take a lot of work. The reason for this is that we do not know enough about the exact composition of the soil, the ground water flowing through it. We do not know the extent of the contamination of each particular material. We do not know how far down it is or in what state it is.

Chromium, for instance, is extremely soluble in water in several forms. In other forms, it is not. So, we need to know exactly what form we have, so we can deal with it. Trivalent chromium, for instance, can be immobilized by adding hydrogen sulfide and making sulfides that are less soluble than the material in water.

Hexavalent chromium, as I said, has a possibility of being immobilized by converting into a compound such as lead chromate. The problem here, as you can readily see, is that if we overdetoxify by adding more lead than necessary, we end up with the other problem of how to get rid of the lead. We need to know exactly what we are dealing with and exactly how to go about it. This is why we need the research and an extensive survey of the area both on top of the soil and down to as far as the materials occur.

One of the problems that we are faced with is that some of the soil types can act as concentrators for these materials so that what would appear to be a sublethal or a subtoxic concentration of material in the water can become concentrated in certain types of soil

and in subsequent high flows of water or in changes of composition of soil water, they could be released in toxic concentrations. We need to know these compounds, what they are and where they are.

The solutions to these problems are not going to be revealed completely by myself or any other one person. We need a team of people that can study it. We need hydrologists, geologists and otherwise.

Mr. BROWN. Would you speak into the mike a little bit closer. We are having trouble hearing you, Dr. Hammond.

Dr. HAMMOND. Very well. The possibility of decontamination rests on a detailed knowledge of the surface and subsurface strata for which we need the services of geologists, hydrologists, chemists and engineers. Certainly, we need the advice of many of the people in the community as to where we need to test for these. Again, after this is cleaned up, there is a possibility for all future avoidance of the problem and this would be a subject which Congressman Brown will be taking up later.

We have already had an input to him on this problem as to the decontamination procedures and also on future avoidance.

I thank you.

[Additional material submitted by James Hammond follows:]

MAY

1010 Pacific Street
Redlands, CA 92373
May 1, 1983

Congressman George Brown
657 La Cadena Drive
Colton, CA 92324

Dear Congressman Brown:

I wish to elaborate upon part of my testimony for the Stringfellow hearing.

I support the Parents of Jurupa in their request to set up a toxic waste cleanup research laboratory at the Stringfellow site. Much work must be done at the site to determine the best methods for neutralizing, immobilizing, destroying and removing the toxic wastes from the site and the surrounding areas affected by the wastes. Costs of the research can be minimized by using the local universities' staffs and graduate students to perform routine sampling and analyses. The methods discovered for cleaning up the Stringfellow problems will be useful in cleaning up other sites.

Prevention of future problems lies in our ability to detoxify wastes economically. Pyrolysis of wastes rearranges their molecular structures to remove toxins, while simultaneously generating a clean gas that can be used as fuel or converted into liquid fuels. This process requires use of all the wastes generated in an area to make destruction of toxic wastes economical.

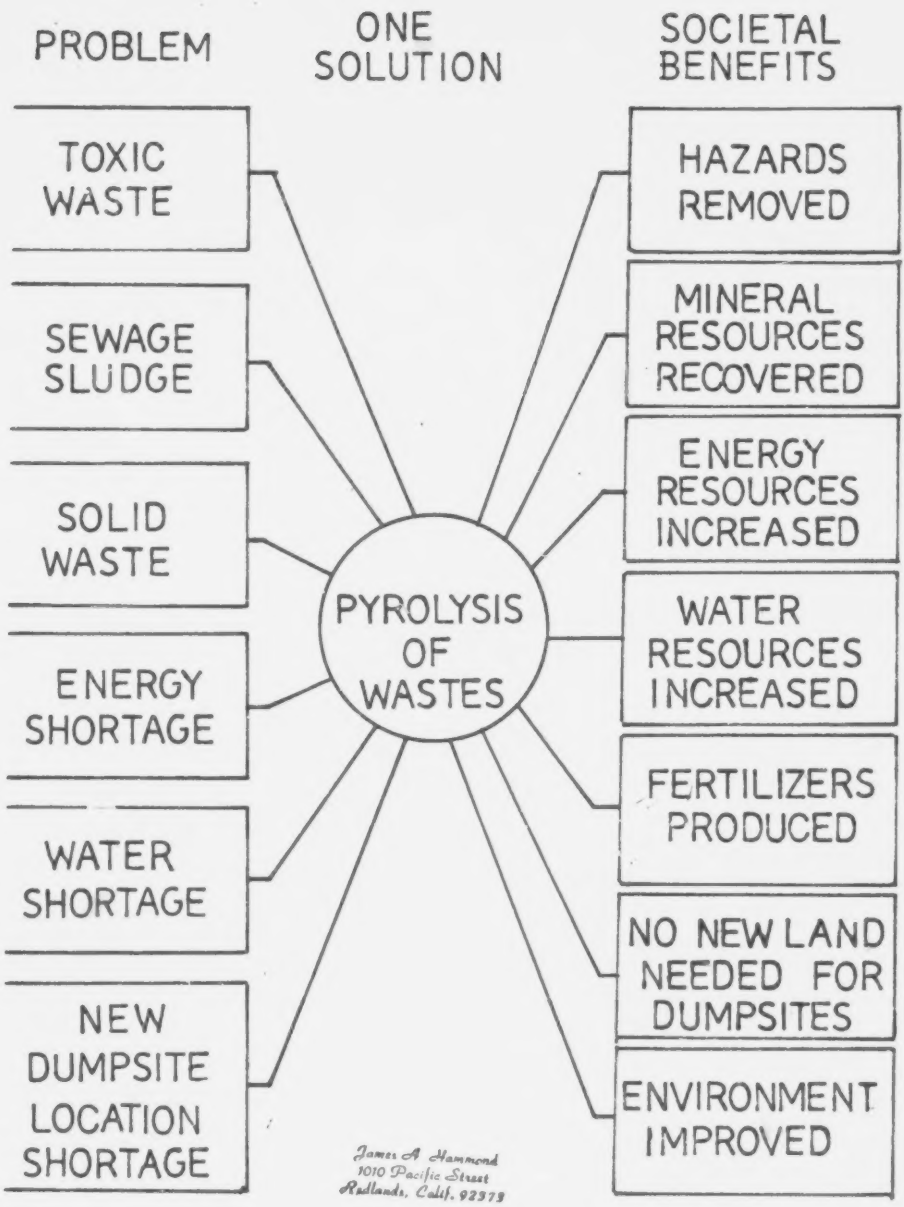
- Pyrolysis plants could be located on existing dumpsites. Plant costs would be competitive with purchase of new dumpsites within the next 30 years.
- Existing collection networks could be used at no extra cost to the taxpayers or generators. (No new taxes!)
- Revenues generated by sale of ex[illegible]s gas (or electric) energy and recyclables would pay for pyrolysis plant operation.

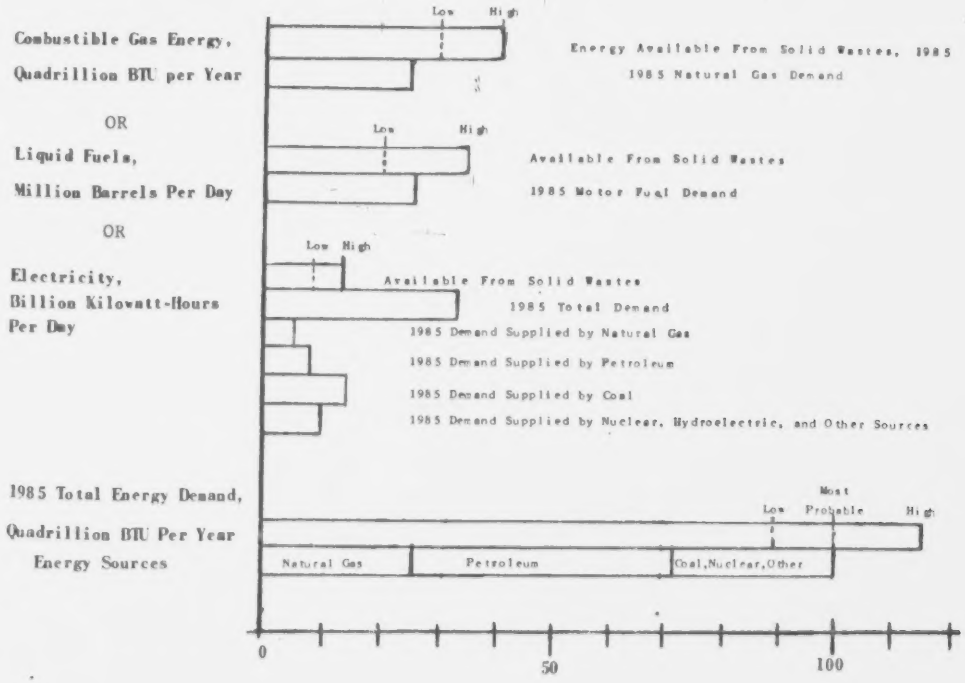
All applicable technology has been available for at least 30 years, with significant materials improvements in the last 10 years to decrease maintenance costs. A demonstration pyrolysis plant was operated in the Los Angeles area 10 years ago and is currently in use by P.S.I. Pyrosol, Inc., 775 Harbor Blvd., Redwood City, CA 94063. The owner, Mr. James Welty, will provide demonstrations on suitable notice.

I have attached two charts to summarize and accentuate the benefits of pyrolysis for waste treatment.

Sincerely,

James A. Hammond


PROBLEM
ONE SOLUTION
SOCIETAL BENEFITS
TOXIC WASTE
SEWAGE SLUDGE
SOLID WASTE
ENERGY SHORTAGE
WATER SHORTAGE
NEW DUMPSITE LOCATION SHORTAGE
PYROLYSIS OF WASTES
HAZARDS REMOVED
MINERAL RESOURCES RECOVERED
ENERGY RESOURCES INCREASED
WATER RESOURCES INCREASED
FERTILIZERS PRODUCED
NO NEW LAND NEEDED FOR DUMPSITES
ENVIRONMENT IMPROVED
James A Hammond
1010 Pacific Street
Redlands, Calif. 92373



ENERGY AVAILABLE FROM SOLID WASTES TO SUPPLEMENT 1985 DEMAND

James A. Hammond
1010 Pacific Street
Redlands, Calif. 92373

Mr. BROWN. Thank you very much, Dr. Hammond. [Applause.]

I thank you all very much for your contributions and I am going to recognize the members of the panel here for questions at this point, starting with Congressman McCandless.

Ms. NEWMAN. Can I allow Mike Belliveau to make a statement——

Mr. BROWN. What is that?

Ms. NEWMAN. Can we allow Mike Belliveau for Citizens for a Better Environment to make a statement regarding the site?

Mr. BROWN. Penny, I think we have gone past the time that we have allowed for this panel already and I think we will get more by asking questions at this point and if he desires to answer any of the questions, that would be satisfactory.

Mr. MCCANDLESS. Thank you, Mr. Chairman. In view of the fact that we have a number of outstanding witnesses, I would like to yield to the chairman—in view of the fact that we have some outstanding professional witnesses that are going to be before us, I would like to yield my time in order to make available the testimony of those, Mr. Chairman. I spent four and a half hours last night on the plane familiarizing myself with the history of the project and the problems that have developed over the years and Ruth Kirkby and I, this morning, reviewed some of them at the site. I would like to take that time for testimony, Mr. Chairman. Thank you.

Mr. BROWN. Thank you, Mr. McCandless. Senator Presley.

Mr. PRESLEY. I say the same thing. Let's hear the witnesses.

Mr. BROWN. Mr. Hayden.

Mr. HAYDEN. Yes. Very, very briefly, just to comment, I think that the citizens' groups ought to be commended because if it was not for yourselves, we might be spending millions of dollars in tax money on completely wasteful projects. The citizens' groups have been treated very often as marginal, secondary outsiders. They have been described as hysterical and paranoid, unprofessional and, yet, in this process, it seems to me, the citizens' groups are the only ones that provide a safeguard that real and permanent solutions will be found instead of cheap or cosmetic solutions.

So, I hope that we will develop amendments to State and Federal law that will clarify and strengthen the role of citizens' organizations in this process and the funding for them. [Applause.]

Mr. BROWN. Assemblyman Goggin.

Mr. GOGGIN. I would like to ask Cecil Johnson a question. I am very concerned about the responsibility of the state and specifically the responsibility of the Santa Ana Regional Water Quality Control Board and from your testimony I gather that you feel that a major part of the responsibility for what happened here belongs with that body and with its staff. What is the specific nature of the action or inaction that that board engaged in that prompted that recommendation?

Mr. JOHNSON. Well, I think that we are speaking of the chairman, Mr. Anderson, who has—this is all documented. We have piles of documents, which—as I said, the one document you have, we have many more, is that we feel that anyone who is protecting the—he has the right to protect the drinking water and the obligation of the people of Glen Avon. He has been negligent and derelict

in that. We have the documents on it. We have more of them. The one I have shown here, which Mrs. Kirkby gave me, is that it shows that he was directed by the California State Department of Health, as I said earlier, to perform certain tests back a few years ago on whether there were heavy metals and organics in the Stringfellow acid pits. He or one of his associates wrote in the margin in pencil, "Don't, don't, don't." "Do some; don't do others," and the ones he said "Don't" to are the heavy metal and the organic pesticides. Montrose Chemical has been dumping DDT there and so forth and so on. There are other—as I said, we have trunkloads full of documents, many of them implicating Mr. Anderson as being derelict of duty. Whoever appointed him was derelict in their duty. [Applause.]

Mr. BROWN. Assemblyman Clute.

Mr. CLUTE. Thank you. I have certainly not been as involved in this whole situation as many of the citizens here and especially Penny Newman. And I just want to take a moment, I congratulate you and the support that you have here. It has really been a tremendous effort that you have done. [Applause.]

Mr. BROWN. I am going to ask all of the members of this panel to provide one additional item of information based on your knowledge of the community, which the record is short on, and that is any information that you may have about the possible or potential health effects in the community. There has been, in my opinion, an inadequate effort to collect this information and I would like to have this hearing record have at least some clues that would lead us in the direction of an adequate epidemiological program. I don't expect you to provide that at this time, but I would like to have you know that we would accept that information and make it a part of the record of this hearing at any time that you can provide it for us, if you would do that for us.

Ms. NEWMAN. Congressman Brown, Concerned Neighbors have done an informal health survey in 1980 when we couldn't get anybody else to look at the health problems just to try to get an idea of what was happening to us. What we found were numerous cases of urinary tract infection, of respiratory problems, skin problems, severe headaches with our children.

The nurse at the Glen Avon School began taking records of the referrals of children to that office and comparing it with other schools that she works at and had told me that the amount is far, far more at the Glen Avon School. I can report to you from personal experience that my own children have suffered severe headaches, seizures, quadriparesis, vertigo, things that you don't expect to find in a normal 10-year-old.

Since he has left the elementary school and gone to the junior high school—we live away from the area itself—his health has improved. We find that, not in just my family, but in families over and over and over again. The teachers at the Glen Avon School are very concerned about numerous health problems that they have encountered, very weird things.

Most of the reports that we get from people are that their doctors simply can't diagnose what is wrong with them and it happens over and over again. That is not normal. Doctors usually—the first thing they want to do is label it. When you have a whole communi-

ty facing health effects where they have no idea of what is causing it, that makes you become alarmed and really suspicious. That type of information I would be happy to provide for you.

Mr. BROWN. It is extremely difficult, even for trained physicians to always draw an exact relationship between symptoms and a potential cause. We know that. We do not expect you to provide proof that every incident is caused by some possible pollutant, but in this case we think it is prudent to assume that where there is a substantial number of indications, that we ought to begin a more intensive investigation of that.

Ms. NEWMAN. There are also reports of numerous birth defects. Apparently, some of the hospitals in the area have reported an increase in the amount of people from this area in the emergency room. We have had a number of reports of miscarriages and that type of thing. So, there are numerous health effects here and that is what the people are concerned about. We are concerned about our family. That is why we are here. [Applause.]

Mr. BROWN. Mr. Johnson would like to say a word.

Mr. JOHNSON. Just a brief word here about this. I think she has hit a crucial area. I think we need to have some person in the field of epidemiology or persons begin to monitor the hospitals where people are born from the people living here in Glen Avon to see if there is a higher number of still birth and birth deformities and do a more quantitative approach statistical analysis of this because that is what has real meaning. I think we should do the hospitals in this area and that would be, I think, important.

Mr. BROWN. We will try and get to that point, Mr. Johnson.

Ms. NEWMAN. Mike Belliveau has a point to make on that.

Ms. TANNER. I was just going to ask Mike if you would comment on your concern and our concern about what might be happening in Sacramento regarding birth defects.

Mr. BELLIVEAU. Thank you. My name is Michael Belliveau and I am a research associate with Citizens for a Better Environment, which is a nonprofit, public interest group concerned about the human health effects of industrial pollution.

In response to Congressman Brown's question, you raised a very good point about our lack of information. Obviously, a lot more work needs to be done to characterize the extent of the contamination. In addition to the unfortunate exposure that has already occurred, we are very concerned about the potential for drinking water supplies to be contaminated. There is offsite contamination. It is not being checked by the extraction wells and there is great potential there for those supplies to be affected.

We have also reviewed technical information for Penny Newman and her citizens' group over the last year and we find a history of shortsighted and inadequate technical assessment and responses and we don't think that this can continue any longer. The more the site is looked at, the more that is uncovered that was not known before. For these reasons the engineers' solutions, which are a quick-fix, temporary-type solutions can no longer be applicable with any confidence.

We really do have to approach a comprehensive assessment of the problem and some solutions and we have to focus, I believe, on long-term public health protection, rather than short term econom-

ic engineering concerns. One of the most important points, I think, that needs to be addressed is that we need to explore all alternatives to long term solution of this problem. There was a lot of presupposition that certain solutions such as maximum removal of the waste material should not be looked at and I don't think the community will accept that any longer, if they ever even did. [Applause.]

Most important of all, and this is related to recent events, actions, and inactions among the Federal and State Governments, is that the public mistrust of Federal and State environmental agencies is at an alltime high. For this reason, we have to generate a mechanism to provide funds to the community so that they can retain their own technical advisers and respond to each of the Government's proposals and actions. I don't think the confidence of the community will be restored by any other means. [Applause.]

Mr. BROWN. Thank you very much. I thank all the members of this panel for an excellent presentation. Obviously, you are representing the sentiments of the community I would infer from the reception that you have received and we appreciate your contribution to the hearing this afternoon. Thank you.

Ms. NEWMAN. May I quickly summarize what we need from you?

Mr. BROWN. No.

Ms. NEWMAN. Sorry, George. We need you to start——

Mr. BROWN. Penny, you are overdoing it.

Ms. NEWMAN. We need each of you to begin——

Mr. BROWN. You are out of order and I order you to desist and if you don't desist, I will adjourn the hearing.

The Chair will call the next panel at this time.

[Commotion in the audience.]

Mr. BROWN. You know, this audience has the power to do one of two things: To allow this hearing to continue or to allow it to end or throw me out, yes. You don't have to throw me out. If you don't want it to continue, I will adjourn the hearing right now.

Penny knows that she has the right to summarize her remarks and submit them to the committee. I have told her that already, but she has taken a half an hour more than the time she was told she would have.

[Commotion in the audience.]

Mr. BROWN. The next panel will be Mr. William Hedeman, Director of the Office of Emergency and Remedial Response from the EPA and Mr. Harry Seraydarian, who is Director of the Toxics and Waste Management Division from region 9, San Francisco.

Before the panel begins, may I try and cool the situation off a little bit. You know, you have a very friendly hearing here today. All of the members of this panel are interested in helping this community and we called this hearing here in order to demonstrate our desire to help. I think you all know that and I think you recognize the need if we are going to finish in the time allotted to exercise a certain amount of discipline over time. If you were conducting this hearing, you would want to do exactly what I am trying to do. Try and keep that in mind, if you will.

I am going to ask Mr. William Hedeman, who is responsible at the national level for the correction of problems such as we have

here at Stringfellow, to present his testimony and I think the audience ought to be interested in what he has to say.

Mr. Hedeman.

STATEMENT OF WILLIAM N. HEDEMAN, JR., DIRECTOR, OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. HEDEMAN. Thank you, Mr. Chairman, members of the Subcommittee on Natural Resources, Agriculture Research and Environment and members of the California State Assembly Committee, I and the representatives at this table appreciate the opportunity to meet with you to discuss the Superfund program and, in particular, its relationship to the Stringfellow site.

I would like to point out that in addition to my overall responsibilities for the Superfund program nationally, most decisions are made with respect to remedies at sites by the Assistant Administrator for Solid Waste and Emergency Response at EPA. However, because of the unique situation involving Springfellow, that decisionmaking was delegated to me personally on June 30, 1982. So, I have a great deal of appreciation for you and the representatives at your table for affording the opportunity for me to listen today to the viewpoints of the citizens of this area and also to personally visit the site and understand more about the problems there.

This particular site has received a great deal of national attention, not the least of which was yesterday when the U.S. Government and the State of California joined in filing a lawsuit against roughly 30 responsible parties at the site. That action is a major step in our administration of the Superfund law which is roughly 2 years old, and reflects our disappointment in being unable to negotiate with responsible parties at the site to a point where they would assume the responsibility to correct the problem adequately.

It is, as you are aware, one of the reasons that we have delayed making decisions at this site with respect to making money available out of the trust fund. However, the United States, having made the decision to proceed in litigation against responsible parties, is now also in a position to proceed with funding remedies at the site. The statement that I have offered to your committee, which I would request be included as part of this record in its entirety——

Mr. BROWN. Without objection, it will be made part of the record.

Mr. HEDEMAN [continuing]. Outlines in some detail the reasons that the agency has delayed up until now proceeding with the final movement of effort to fund this site. I would like essentially to go in the interest of time to the remainder of that statement, which focuses on what we are currently planning to do at the Stringfellow site.

In light of the unsuccessful enforcement negotiations which culminated yesterday with the lawsuit, EPA and the State of California have resumed work on a cooperative agreement to proceed with clean up financed under Superfund. In the interim, the State has continued to operate the leachate containment system and transport the leachate to a treatment facility.

In making our decision for both the short- and long-term actions at Stringfellow, as well as other sites in the country, we must comply with the provisions of the law. One of those provisions, which Mr. Hayden reflected in an editorial in today's newspaper, is the requirement in the law that we select the cost effective alternative for clean up. That is, the alternative that is not the cheapest, as it has been represented here, but the one that, from a least cost perspective, is also technologically feasible, reliable, and would adequately protect human health and the environment. This requirement forces us to make tough decisions in managing the limited dollars in the trust fund. At the conclusion of both the long- and short-term studies, the analyses will help us select those remedies for the Stringfellow site.

The scope of work now under consideration at Stringfellow is estimated to cost between $7 and $11 million, including about $4 million reimbursement to the State for work previously done at the site.

I would make a point at this time, Mr. Chairman, of the fact that the national average that we have operated under in terms of administering this program is that each site will cost not more than $6 million to clean up. It appears very evident that many sites such as Stringfellow are going to take us into the wider range of $30 to $40 million or perhaps even more. And I think that this is something that requires national attention in terms of the extent of this program, the limitations that now exist and the extent to which those limitations must be addressed by national and State leadership throughout the country.

The project consists of four elements and the first one will be a remedial investigation and study of the entire area. That has three basic objectives: To identify the areas where upgradient ground water is entering the site and methods to reduce and eliminate that inflow; second, to identify hazardous substances that are still on the site and to evaluate the effectiveness of barriers preventing their migration off the site; and, finally, to determine the characteristics and extent of contaminated ground water downgradient of the site. No decisions, absolutely no decisions, have been made at this time by me or any officials at EPA as to exactly what remedy will be implemented to deal with those three basic problems.

The feasibility study will consider alternatives for both the short- and the long-term final solutions. We will expedite the evaluation of methods to control ground water contamination and also the evaluation of alternatives for treatment of onsite contaminants. This expedited review will occur while the longer term investigation and feasibility studies are underway.

In the longer term phase of this operation, we intend to evaluate alternatives for additional measures to control the source of the contamination and to reduce the future costs of operating and maintaining the site. These alternatives will take into account requirements for restoration of the land for future use, if that is possible. The study also will look at any offsite measures needed to control the contaminated ground water.

I would point out, Mr. Chairman, that at the end of any of the analyses that we do with respect to alternatives, the community will be fully involved, will have the opportunity to comment on

each of the alternatives under consideration, to offer their views, their recommendations, their suggestions for improvement in the study, and their views as to the strengths and weaknesses of that study.

The second element in this proposed funding package that we are working on with the State is to immediately fence the site and take measures to control erosion. Together, they will help minimize the possibility of anyone coming in direct contact with the substances at the site. Erosion control measures will include revegetation and grading to prevent deterioration of the protective cap and minimize the chance of leachates.

The third element is to continue to operate the leachate containment system set up in 1981 and to transport the leachate offsite until a final remedy can be implemented.

Finally, the last element will be to reimburse the State of California for the allowable costs it has incurred at the site since December 11, 1980.

We have underway, while we are working on the final cooperative agreement with the State, an engineering study that I have instituted from my office to examine exactly what has occurred at this site to date in order that I can be advised whether the work and the expenditures at that site are in compliance with the provisions of the law and, therefore, eligible for funding at that site. I expect all of this to be concluded by the first week in June and that sometime within the month of June or early July that we would be in a position to make this money available to the State.

VOICE [inaudible].

[Cheering and applause.]

Mr. BROWN. Senator Presley.

Mr. PRESLEY. On that point, Mr. Hedeman, there is a Federal audit that I understand has just been released on this subject.

Mr. HEDEMAN. That is correct.

Mr. PRESLEY. And as I understand it—we had a little difficulty in getting a copy of it in California and we are analyzing it now, but there is some indication that we may not get more than about $1 million out of that $4 million. Is that still within the realm of probability or do you think that will improve, or have you analyzed the audit?

Mr. HEDEMAN. I have not analyzed the audit and I am unaware of that situation. That is the first that I have heard of it.

Mr. PRESLEY. The reason that I was reminded of it when you mentioned the allowable cost and that is what, as I understand it, is being mentioned in the audit. So, we just have to wait a little longer to know whether it is $4 million or whether it is $1 million, I guess.

Mr. HEDEMAN. Yes, sir; but I can tell you that I am personally not aware that there is a problem there. As I am advised by my staff, we are still talking in the $4 million area.

Mr. BROWN. Please continue, Mr. Hedeman.

Mr. HEDEMAN. I would like to summarize for you now where we are nationally in the implementation of the Superfund Program. The first 2 years of the program were devoted to building the necessary policy and regulatory framework and also developing feasibility studies for a number of sites throughout the country.

In addition, we have continued to implement the emergency and removal activities given to us in the law. This aspect of the Superfund Program has not received a great deal of national attention because it inherently is not as controversial, but it is an area in which we have achieved the most immediate results. By the end of March, we had taken a total of 119 emergency actions throughout the country, either by ourselves or in cooperation with the Coast Guard, and have completed 105 of these for a total expenditure of approximately $26 million. Total surface clean up has been completed at over 62 sites. These are sites in addition to those that are on the national priority list, such as Stringfellow.

For 48 sites on the national priority list, we have had to step in on an emergency basis when conditions at the site presented an immediate and significant public health threat. We have not hesitated to exercise that authority and would do so at Stringfellow if circumstances warranted.

For the long-term remedial action, including sites such as Stringfellow, we are compiling a fairly impressive record. As of the beginning of this month, we have obligated $75 million, which includes 62 feasibility studies, 18 designs, and 14 remedial actions.

The fiscal status of the Superfund Program and the trust fund can be described as follows: To correct a misconception, we did not get $1.6 billion in 1980 to begin this program. In 1980, the program began through a tax. That tax, as of the end of February 1983, had total receipts of $580 million. Of that total, $475 million has been appropriated from the trust fund to EPA and other Federal agencies by the Congress, of which we have obligated over $255 million. This leaves a balance of $220 million that the Congress has made available to us for obligation and I have full anticipation that we will be able to do that by the end of this fiscal year.

The 1984 budget request is for $310 million out of the trust fund, which reflects a 48-percent increase over 1983 levels. While the tax will end in 1985, we anticipate that the program will continue to work on more costly construction and design phases at sites for an additional 2 to 3 years.

Before we select the alternative at a site, such as Stringfellow, we normally conduct an assessment of the impact on health, welfare and environment that would be provided by that alternative. At this time, such reviews take the form of endangerment assessments, where the no-action alternative, of essentially doing nothing, is compared with the recommended solution. We are developing an overall policy for these assessments now, which may use guidelines to assess these alternatives.

We intend to develop those guidelines based on a number of sources. When Federal or State standards are appropriate, for example—those covering drinking water or air—they may be used as the guidelines. However, many of these standards can be used as is, while others are simply not suitable for the purposes in their present form. When the standards are not available, the guidelines will be based on toxicological data, which requires gathering, analyzing and reviewing large quantities of data at the site. Our Office of Research and Development, to which Mr. Hill, who is to my far right is associated, is helping us in this effort.

Mr. Chairman, my statement closes with a detail of some of the components of our research and development program underway at EPA, which includes technology for use on onsite treatment of contaminated water, assessment of the compatibility of grouts and various types of equipment that have been developed, which can be mobilized and brought to sites to correct problems.

I wish to thank the committee members for this opportunity to outline our activities at Stringfellow and our progress in implementing the program and I would be happy to take any questions at this time. Thank you.

[The prepared statement of Mr. Hedeman follows:]

STATEMENT OF WILLIAM N. HEDEMAN, JR.
DIRECTOR, OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE JOINT HEARING OF

THE SUBCOMMITTEE ON NATURAL RESOURCES,
AGRICULTURE RESEARCH, AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY
U. S. HOUSE OF REPRESENTATIVES

AND

COMMITTEE ON CONSUMER PROTECTION AND TOXIC MATERIALS
THE CALIFORNIA STATE ASSEMBLY
GLEN AVON, CALIFORNIA

APRIL 22, 1983

Mr. Chairman, members of the Subcommittee on Natural Resources, Agriculture Research, and Environment, and members of the California State Assembly Committee on Consumer Protection and Toxic Materials, I am William N. Hedeman, Jr., Director of EPA's Office of Emergency and Remedial Response. This is the Headquarters Office charged with implementing the Superfund.

With me today are Harry Seraydarian, Director of the Toxics and Waste Management Division of EPA's Region IX San Francisco Office, and Ronald Hill of the Municipal Environmental Research Laboratory, EPA's Office of Research and Development, Cincinnati. Today, I will describe what EPA has done so far at the Stringfellow Acid Pits, the top priority Superfund site in California, and what we intend to do. I will then summarize the status of the Superfund program, and close with a brief description of our current research and development efforts in the area of waste disposal technology.

The Stringfellow site consists of 22 acres in a canyon that is 5 miles northwest of Riverside, in the Jurupa Mountains. It lies in the drainage path of 270 acres of canyon watershed. Between 1956 and 1972, the site received an estimated 34 million gallons of liquid wastes, including spent acids, pesticides, other organic compounds, and heavy metals. Wastes were put in 14 lagoons and ponds for solar evaporation.

The first incident reported at the site occurred in March 1969, when heavy rains caused a breaching of the lowest containment barrier. A second incident occurred in March 1978.

In 1974, the Santa Ana Regional Water Quality Control Board took over the site after operations had been abandoned by the Stringfellow Corporation. In March 1980, EPA involvement at Stringfellow started. The Santa Ana State Regional Quality Control Board asked for help from EPA's Regional Response Team because the lagoons threatened to overflow for the third time since 1969. The Board had spent all of a special State appropriation of $370,000 for emergency activities at the site. In March of 1980, and again in August and September, the Regional Response Team led by EPA directed the removal of over 10 million gallons of waste from the site. About $825,000 was spent from funds made available under section 311 of the Clean Water Act to remove the wastes, reinforce containment barriers around the lagoons, and repair truck-loading areas.

Following these activities, the Santa Ana Regional Water Quality Control Board undertook a construction program to stabilize the site. Again, EPA assisted in May 1981 by awarding to the State a $95,000 cooperative agreement (using funds made available under the Resource Conservation and Recovery Act) for design work and additional analyses related to the State's proposed construction program.

With the design completed, the State undertook additional measures to reduce the possibility of further contamination from heavy rains. The State neutralized acidic sludges, took measures to contain leachate migration and runoff, graded the site, and capped it with a layer of clay. Currently, the leachate is being collected and transported to an off-site disposal facility.

The Santa Ana Regional Water Quality Control Board initially considered several alternatives to remedy the contamination, choosing on-site containment as the cost-effective remedy. The Department of Health Services, which in August 1981 was designated responsible for Superfund activities in California, also agreed to on-site containment. Based on this decision, the Department, in mid-June 1982, submitted a draft Cooperative Agreement to EPA Regional and Headquarters personnel for review. In managing such a large, nationwide program, EPA Headquarters relies heavily on its Regional Offices. Because they are close to the scene, they have a lot of detailed and first-hand information. We have worked closely with our people in San Francisco.

We received the final Stringfellow cooperative agreement application during mid-summer 1982. During this time, however, three factors emerged causing the award of the cooperative agreement to be held in abeyance. First, we needed to complete the paperwork required to obtain a deviation from our own grant regulations to reimburse the States for funds spent

prior to its application for Superfund monies. This is one step in the process I will outline later in more detail.

Second, I was directed by the Administrator to examine the issue of cost-sharing at Superfund sites as it relates to public ownership or responsibility. Section 104(c)(3) of CERCLA states that States must contribute at least 50 percent of cleanup costs for sites that are publicly owned, versus 10 percent for sites that are privately owned. The Agency had encountered this issue on several previous sites and in discussions with our Office of General Counsel it was becoming more clear that the conditions surrounding State ownership and responsibility at individual sites were widely varied. Therefore, the Administrator directed me to undertake a study of all sites that could potentially be placed on the National Priorities List based on their ownership characteristics and degree of responsibility for the site. This involved examining ownership data for over 650 sites, including Stringfellow, that were nominated by the States and EPA's Regional Offices as candidate sites for the National Priorities List. Because of the strict requirements we imposed on assessing these candidate sites, many of these sites were not submitted to Headquarters until August or September of that year. The study was completed and presented to the Administrator on December 1, 1982, and she rendered a decision a week later which concluded that Stringfellow should be a 10 percent site. Subsequent to that study, OGC formalized an opinion

on December 22, 1982, that the law is not clear on whether situations like Stringfellow should require 10 or 50 percent cost-sharing, but that the better reading of the law suggests that in situations where the State owns a site after active disposal has ceased, a 10 percent cost-share is appropriate.

The third factor affecting the progress of the Stringfellow cooperative agreement concerns the enforcement element of the Superfund program. EPA's enforcement authority under CERCLA includes the imminent hazard abatement provisions of section 106.

Section 106(c) of CERCLA requires guidelines for "using the imminent hazard, enforcement and emergency response authorities of this section . . ." On May 13, 1982, "Guidelines for Using the Imminent Hazard, Enforcement and Emergency Response Authorities of Superfund and Other Statutes" were published in the Federal Register (47 FR 20664) as a policy statement pursuant to section 106(c) of CERCLA. These guidelines provide that we first call on parties who have caused or contributed to the presence of hazardous substances at a site to rectify the problems caused by those substances, in order to give responsible parties an opportunity to propose and implement a remedy for the site on their own through negotiations with EPA. This policy of seeking privately funded remedies will help conserve limited Fund monies for other cleanup use.

The purpose of this pre-litigation negotiation is to encourage cooperative responsible parties to clean up sites. Cleanup resulting from negotiation and settlement sometimes occurs more quickly than cleanup resulting from litigation. In addition, private party cleanup will free Superfund dollars and make Federal and State technical and legal resources available for additional sites.

Negotiation can be particularly effective before litigation begins. The threat of litigation or administrative orders during pre-litigation negotiations gives the Federal Government valuable leverage because settlement would allow private parties to avoid the great expense and adverse publicity involved in litigation. This leverage is sacrificed if the Federal Government automatically files cases before it begins negotiations with responsible parties. In addition, filing lawsuits before negotiations even begin alienates potentially cooperative responsible parties.

In the past, EPA has found that companies would adamantly oppose settlement discussions based on the government's theory that their liability was joint and several. In order to take advantage of greater cooperativeness before litigation, the Agency agreed that it would consider offers made on the basis of a "fair share," that is, an offer made to do the work necessary or, in lieu of that, to pay the cost of the

work which is proportionate to the amount of waste the responsible party delivered to the site in question. The Agency will not, however, settle on this basis on a company by company basis; rather, we would look to an offer which would remedy all or a significant part of the environmental prob[illegible] In addition, the Agency would not settle on this basis if it significantly reduced the likelihood of success for the remainder of the cleanup against the nonsettling parties. Since these negotiations are complex and time-consuming, EPA generally tries to limit the negotiation time before litigation or issuance of an administrative order to between 60-120 days. To date, EPA's enforcement program has operated within these guidelines.

"Fair Share" settlements have not been available once an enforcement action has been formally commenced. Once an enforcement action is initiated additional costs are incurred by the Federal and State Governments.

While EPA had compiled a significant amount of information on the responsible parties that had contributed waste to Stringfellow, in August, the former owner of the Stringfellow site supplied us with additional records. The records were surprisingly complete and provided a stronger basis for identification of the parties potentially responsible for wastes at the site and the extent to which they contributed to the site.

On August 24, 1982, Region IX informed over 200 generators, transporters, and owners/operators of their potential liability for site cleanup and reimbursement under Superfund. In September, Headquarters referred the case to the Department of Justice for potential litigation under sections 106 and 107 of Superfund and other statutory authorities. Then in October 1982, several more responsible parties were notified of their potential liability based on additional information that became available.

The initial meeting to establish the framework for settlement negotiations was held in Los Angeles on November 18, 1982. The responsible parties attending the meeting were asked by EPA and the Department of Justice to form a steering committee to represent all potentially responsible parties during the negotiations. The steering committee was formed on December 15, 1982. From December 16, 1982, to February 23, 1983, a committee representing EPA and the State negotiated with the steering committee, seeking to obtain a commitment for full funding of past and future remedial actions.

On February 23, 1983, the steering committee presented its "principles for settlement." The government agreed to some of these principles, but not to others. The steering committee was willing to discuss only a total cash offer that covered their estimate of costs of past, ongoing, currently proposed, and future phases of work. Subsequently, the

negotiations stalled. Consistent with the enforcement policy I discussed previously, and in order to avoid protracted negotiations, the State of California and EPA decided to file a joint complaint. The Department of Justice has advised me that yesterday (April 21) they filed the lawsuit.

Before moving on to description of the proposed actions at the Stringfellow site, let me discuss briefly one last factor that has affected our decisions on Stringfellow and indeed on all our sites, and further explains why the Administrator felt compelled to carefully examine the conditions under which EPA should require States to pay at least 50 percent of the costs of remedial response at publicly owned sites. The Administrator expressed to me on numerous occasions the concern for the need to manage Fund monies wisely and responsibly. Given the limited amount of money in the Fund and the prospect of many high cost projects, policies such as the 50 percent cost share and required State matching in the planning stage were viewed as a means to both stretch Fund monies and to assure a high level of State support and participation from the earliest phases of a project.

On August 7, 1982, I provided the Administrator with various scenarios that would show that our ability to clean up sites on the National Priorities List using monies from the Trust Fund is limited. Budget estimates have operated on the presumption that the average cost for a site clean up would be $6.5 million.

Experience at several sites, including Stringfellow, was beginning to reveal that these estimates may be conservative. This briefing prompted her to express the need to examine alternative ways to stretch the Fund to clean up as many sites as possible without starting more sites than we had funds for. I think it became evident to her at that briefing that while $1.6 billion sounds like a lot of money, it will provide adequate funds to take remedial action at not more than 170 sites. In light of that analysis, I am of the personal view that the Administrator felt an even greater responsibility to ensure that the EPA fully explored all avenues available to stretch the Fund, which included full exploration of the enforcement authorities provided in the law and potentially requiring States to fund 50 percent or more of the costs, before she made a final decision at the Stringfellow site.

I would like to move on to describe in some detail the actions that are currently proposed at the Stringfellow site. In light of the stalled enforcement negotiations, EPA and the State have resumed work on a cooperative Agreement to proceed with cleanup financed under Superfund. In the interim, the State has continued to operate the leachate containment system and transported the leachate to a treatment facility. In making our decision for both long and short term actions at Stringfellow -- as well as at other sites -- we must comply with all requirements of the Superfund law.

One of those requirements is that we select the "cost-effective" alternative for cleanup -- that is, the alternative that is the one requiring the least cost, but which also is technologically feasible, is reliable, and adequately protects human health and the environment. This requirement forces us to make tough decisions in managing the limited dollars in the Trust Fund. At the conclusion of both long and short-term feasibility studies, the analyses will help us select those cost-effective remedies for the Stringfellow site.

The scope of work now under consideration is estimated to cost between $7 and $11 million, including about $4 million reimbursement to the State (which I will discuss later) for past work performed at the site. The project consists of four elements. The first element is a remedial investigation and feasibility study. The investigation has several objectives:

- To identify areas where upgradient ground water is entering the site and propose methods for reducing that inflow.
- To identify hazardous substances remaining on-site and evaluate the effectiveness of barriers preventing their migration off the site.
- To determine the characteristics and extent of contaminated ground water downgradient of the site.

The feasibility study will consider alternatives for both short-term and long-term actions. It will expedite the evaluation of methods to control ground water contamination (off-site remedial actions) and also the evaluation of alternatives for treatment of on-site contaminants. This will occur while the remedial investigation and the long-term phase of the feasibility study are underway. In the long-term phase, we will evaluate alternatives for additional measures to control the source of the contamination and to reduce the future costs of operating and maintaining the site. These alternatives will take into account requirements for restoration of the land for future use. The study also will look at any off-site measures needed to control the contaminated ground water.

The second element in the proposed project is to immediately fence the site and take measures to control erosion. Together, they will help minimize the possibility of anyone coming in direct contact with the hazardous substances at the Stringfellow site. Erosion control measures will include revegetation and grading to prevent deterioration of the protective cap and minimize the chance of leachates going into the ground water.

The third element is to continue to operate the leachate containment system set up in mid-1981 by California and to transport the leachate to an off-site facility.

The last element of the proposed project is to reimburse the State of California for the allowable costs it has incurred at the site since December 11, 1980 (the date of enactement of CERCLA). Federal regulations define allowable costs as those that are reasonable, are necessary and can be allocated to a specific activity.

To satisfy the question of allowability, we took two actions. First, the Inspector General of the Western Division of the Office of Audit conducted a fiscal audit, which reviewed documentation to ensure that all costs claimed by the State were allocable to the project. The audit also raised some policy issues, the most important one involving contracts with companies that were later identified as potential responsible parties. The degree of liability is being studied at this time.

The second action related to the fact that the majority of work was performed before the National Contingency Plan was promulgated in July 1982. We are conducting an independent technical review, as required by the law, to ensure that the work is consistent with the intent of the Plan and the Superfund law, and also to determine the reasonableness and necessity of previous work in relationship to the overall remedial action proposed by the pending cooperative agreement.

Based on the findings of the audit and the review, we intend to obligate money for all reasonable and allowable costs expended to date, as part of the cooperative agreement.

Let me summarize for you now where we are in the implementation of the Superfund law. This major piece of environmental legislation has required a strong working relationship between the Federal Government and the States for response actions; extensive consultation and cooperation among Federal agencies; and a system of accountability to the American taxpayer for the efficient and effective management of Fund monies. The first two years of this program have been devoted to building the necessary policy and regulatory framework on which to base actions and the development of feasibility studies to diagnose the problem at a large number of the sites. With that phase of the program essentially behind us, we are now ready to move into high gear in achieving the goals the Congress set for us when it passed the Superfund Law. This will include the obligation of large amounts of money for the construction of remedies at many sites, including Stringfellow.

In addition, the Agency has continued to implement the emergency or removal authorities provided in the Superfund act. This aspect of Superfund has not received a great deal of national attention because it is inherently not as controversial, but it is the area in which we can achieve the most

immediate results. By the end of March, a total of 119 removal actions had been approved for implementation by EPA or the Coast Guard; of these, 105 have been completed and over $26 million has been obligated to date. Total surface cleanup has been completed at over 62 sites. These are sites in addition to those on the priority list for remedial action. For 48 sites on the priority list, we have had to step in on an emergency basis when conditions at the site presented an immediate and signficant threat to public health. In short, EPA has not hesitated to exercise the emergency authorities provided by the Act to protect public health and the environment, and would do so at Stringfellow if circumstances warranted.

For long-term or remedial action, the Agency is compiling a growing record of work underway. As of the beginning of April, about $75 million has been obligated for remedial actions; these include 62 feasibility studies, 18 designs, 14 remedial actions and 15 initial remedial measures. This has required entering into 42 cooperative agreements and 37 contracts with over 20 States.

The fiscal status of the Superfund program and the Trust Fund can be described as follows. As of the end of February 1983, the Fund had total receipts of approximately $580 million. Of this total, $475 million has been appropriated from the Trust Fund for use by EPA and other Federal agencies, of which the

Agency has obligated over $255 million. This leaves a balance of $220 million that Congress has made available for obligation, $200 million of which we anticipate obligating by the end of the fiscal years in September. The 1984 budget request for Superfund of $310 million reflects an increase of 48 percent over 1983 levels and an increase in resources for site cleanup of nearly 55 percent. While the Superfund tax will end in 1985, we anticipate the Superfund program will continue work on the more costly design and construction phases at sites for an additional two to three years.

Although much of our overall strategy for implementing Superfund is in place, a few issues are still unresolved. One is the kind of cleanup we undertake and how far we have to take it to adequately protect health and the environment.

Before we select the alternative at remedial sites, we normally conduct an assessment of the impacts on health, welfare and the environment. At this time, such reviews take the form of endangerment assessments, where the no-action alternative and the recommended solution are discussed in relationship to the impact on the surrounding population and environment. We are developing on overall policy for these assessments, which may use guidelines to assess remedial alternatives. We intend to develop guidelines based on a number of sources. When Federal standards are appropriate - for example, those covering drinking water and ambient air -- they may be

used as guidelines. Many of these standards can be used as is, while others are not suitable for our purposes in their present form. When standards are not available, guidelines will be based on toxicological data, which requires gathering, analyzing and reviewing large quantities of data. EPA's Office of Research and Development is helping us in this effort.

These guidelines will be used to screen the alternatives in the following manner: all alternatives will be compared to the guidelines for protecting human health. Any alternative not meeting the guidelines will be rejected or revised. We will select, from those remaining, the one that is most cost-effective. This means that we will not clean up every site to the same level -- but all cleanups must be consistent with the guidelines, while the cleanup is in progress and when it is completed. We are developing similar guidelines for protecting the environment during and after site cleanups.

A second component of our strategy entails the development of alternatives for clean ng up hazardous waste sites. EPA's work in this area is conducted by the Office of Research and Development. The overall goal of ORD's program is to provide the core of scientific and technical expertise needed to support implementaion of Superfund. This program concentrates on:

- Technology for use on-site to treat contaminated water and for the incineration of hazardous waste has been developed and demonstrated by EPA. A mobile carbon filtration system ("Blue Magoo"), which can be used at a spill site to remove organic contaminants from water, and a truck-mounted incineration system capable of handling either liquids or contaminated soils are examples of this technology.

- An assesment of the compatibility of grouts with hazardous wastes.

- The preparation of a handbook describing and evaluating the uses of slurry trench techniques for controlling migration of contaminants is nearing completion.

- Studies of new and innovative technologies including chemical or biological techniques, advanced equipment using incineration/thermal process to destroy hazardous wastes, and new land disposal techniques.

I wish to thank the committee members for this opportunity to outline our activities at Stringfellow and our progress in implementing the Superfund program. I would be happy to take any questions from the committees at this time.

Mr. BROWN. Thank you, Mr. Hedeman.

I would like to recognize Ms. Tanner first for questions.

Ms. TANNER. Mr. Hedeman, you tell us that you are going to begin investigating the site and doing feasibility studies. Is that what you said?

Mr. HEDEMAN. I said that is part of what we are going to do.

Ms. TANNER. Haven't you been doing feasibility studies for the last 2 years?

[Cheering and applause.]

Mr. HEDEMAN. Mrs. Tanner, no, the agency has not, as you are perhaps aware.

Ms. TANNER. No; but I am really curious about it because, obviously, if Stringfellow was considered one of the most serious problems in the State or throughout the country, it would seem to me that feasibility studies should have been started a long time ago. [Applause.]

And I am wondering, because I really didn't get the gist of it, when do you think you are really going to get started here?

Mr. HEDEMAN. I did not hear the last part of your question.

Ms. TANNER. I didn't get the feel of when you really are going to get started to clean up this site. If we are talking about another set of studies, another set of alternate investigations, another set of evaluations, it occurs to me that we must have many evaluations, feasibility studies, investigations available to us right now.

Mr. HEDEMAN. To the extent that we have information on the exact area of the site, you probably are correct. If you were on the visit this morning, what impressed me is we do not have that much information about exactly where the water is coming from up gradient, what effect that is having on the site there and we also do not have that much information on exactly what is happening down gradient of the site; whether, indeed, the collection wells and the pumping are able to contain the contamination or whether it, indeed, is escaping that and getting downstream.

Now, if you are aware of that information, I would be happy to look at it, but I honestly don't believe it exists because we are dealing with information that is necessary based on the interim remedy that is currently there.

Ms. TANNER. How can—and I am really serious about—sincere—in this question—how can the EPA put the Stringfellow on the top of a list or how can the State do that same thing without knowledge of what is in that—or some knowledge of what is in those pits and some knowledge of what to do about them. I mean, if we are just beginning to make studies, it doesn't make sense to me. [Applause.]

Mr. HEDEMAN. The site has been put on the national priority list, based on our knowledge of the contamination that is there and the potential for that contamination to be exposed to the public and thereby affect their health through ground water, surface water and air emissions.

Now, I have enough information to make that judgment and to score that site in order to list it on the national priority list, but I don't have the information to tell me exactly how that contamination is traveling from the site and what effect other forces, includ-

ing the water coming from the hills above the site, are having on the contamination that is still there.

Mr. BROWN. Thank you, Ms. Tanner. Mr. McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Mr. Hedeman, as you gave us your remarks, a part of those remarks were that the community would be involved in the process at the time that you got involved in the decision and the timeline for, hopefully, the complete correction of the problem.

Mr. HEDEMAN. That is correct, sir.

Mr. MCCANDLESS. For the purpose of the group here, this is a very important area, based upon previous testimony. Would you explain to us and to those in the audience how EPA involves the community?

Mr. HEDEMAN. The approach that we have taken at other sites in the country as we finish doing the investigative work and developing various alternatives, is to develop a preferred alternative, present it to the public and give them an opportunity of roughly 1 month to review the documents and to prepare to give us their input either in writing or through testimony at public meetings.

Our approach has been to create an atmosphere that is as informal as possible so that the public will not feel intimidated, for lack of a better word, by the formality of the process and will have the ability to—willingness—to come forward and give us their views and their recommendations.

Mr. MCCANDLESS. Mr. Chairman, one more quick thought here, in view of the history of this particular subject and all of the circumstances that have surrounded it, may I offer for the benefit of the EPA and not the least of which, the citizenry, that we look at an open forum type of discussion where understandings of the technical aspect of the options are laid in a manner in front of the community so that they might understand what it is that the options are and what the benefits and what the other aspects of that might be. I believe than an informed community along this line would be an asset to what I want to see accomplished and that is the ultimate solution of the problem. [Applause.]

Mr. HEDEMAN. I think that is a very good suggestion. Generally, our practice is to have an opening presentation of that sort before the community reacts and we will do it at this site.

Mr. MCCANDLESS. Thank you, Mr. Hedeman. Thank you, Mr. Chairman.

Mr. BROWN. Mr. Clute.

Mr. CLUTE. Thank you, Mr. Chairman.

I think those were some relevant points that Congressman McCandless made and I just want to follow up, as someone mentioned in the audience, the timeline when actually physically the project would be begun and would start to detoxify and take care of that contamination. What kind of timeline would enter in?

Mr. HEDEMAN. The fast track portion of the study that I mentioned in my statement will take less than 6 months and then we hope to be able to focus on the interim measures at the site and the extent to which we can either treat the waste that is there, which was suggested by one of the panel members from the community, and/or have to continue to truck it away.

The longer term study of the up gradient areas where we have very little information, frankly, and the down gradient areas, including monitoring the wells, probably will take 12 to 15 months.

Mr. CLUTE. You are saying by the end of this year, before the end of this year, there would be some work begun?

Mr. HEDEMAN. Yes, I would hope that. I would say by the end of this year we would be able to make a decision in terms of whether or not it is feasible, among other things, to treat the leachate water that is at that site onsite or whether it is essentially not feasible to do that. I am saying that in terms of additional correction of problems, up gradient and down gradient, we generally will need about a year to do that because of the hydrological cycle of water and the inability to predict exactly during various seasons how that water is behaving.

Mr. CLUTE. I just hope that it is definitely a top priority. It will help speed it up.

Mr. BROWN. Mr. Hayden.

Mr. HAYDEN. One of the objectives of this hearing is to examine the interaction between the States and the Federal Government in determining how this program works. There have been a lot of stories about manipulation of the relationship, manipulation of the funds, so I just wanted, while you are here, to get some clarification of what the relationship is.

First of all, let me clarify your status as Congressman Brown mentioned earlier to see if we have it right. Now, when Rita Lavelle excused herself from participating in the negotiations regarding Stringfellow on the grounds of conflict of interest, I take it that she appointed you to be the EPA official with the responsibility for those negotiations. Is that correct?

Mr. HEDEMAN. For the funding part of it, that is correct.

Mr. HAYDEN. OK. And you remain in that capacity today?

Mr. HEDEMAN. Yes; I do.

Mr. HAYDEN. And you will remain in that capacity in the future?

Mr. HEDEMAN. I am assuming that I will because no one seems to have volunteered for it.

Mr. HAYDEN. All right. I want to show you some documents that you may already be familiar with. These are some documents from congressional hearings, but, first, I wanted to ask you if it is correct. You are quoted in the April 8 New York Times at a hearing in Washington before the Senate as saying that you felt that the Administrator of the EPA had "an implicit policy to curtail the progress of the program." Is that correct?

Mr. HEDEMAN. I did make that statement before the Senate Environment and Public Works Committee, yes.

Mr. HAYDEN. You are referring to Ms. Lavelle?

Mr. HEDEMAN. I was not. I was referring to both Ms. Lavelle and Mrs. Burford.

Mr. HAYDEN. And you also said, if I am quoting correctly, that they made it very clear that they did not favor an expansion of the Superfund.

Mr. HEDEMAN. That is correct.

Mr. HAYDEN. Now, in this other document which I have given you, which is the notes on a meeting between Rita Lavelle and a person named Mr. Metis in the White House, there is reference to

California and perhaps to Stringfellow that I cannot understand. On the fourth page it says, "California, Duke as attorney general, hold."

Mr. HEDEMAN. I didn't hear the last. You are on page 4?

Mr. HAYDEN. Yes.

Mr. HEDEMAN. Is this the typewritten——

Mr. HAYDEN. It is in the handwritten notes of the meeting. Then, on page 5, it says, "Sonya Crow," who is the regional administrator here, "Arizona," which is presumably where she was and then it says, "Call tomorrow. Have to think on Deukmejian. Not sure if it is a positive story."

Now, we have heard so many explanations and rumors about why that money was held up and we know from his own writing that our former attorney general, Mr. Deukmejian, and our current Governor, wrote in a report last year that the money was approved. What, in your opinion, happened? Can you clarify these notes in any way for us?

Mr. HEDEMAN. No; I have seen copies of part of these notes in the Washington Post, but never the entire document. I can tell you that shortly into the month of August 1982, as my testimony reflects, I was instructed by the Administrator, Mrs. Burford, that no decisions would be made at any site that was under some form of State or local public ownership until she resolved how she would interpret the provisions of the Superfund law in terms of whether the contribution would be 50 percent or 10 percent. It is a very complicated legal issue, which I decided not to get into this afternoon.

Essentially, the law is unclear as to whether or not public ownership of a site in terms of requiring a 50-percent contribution from the State can occur at any time or must only occur at the time of the physical disposal of waste in the site. In the case of Stringfellow, the site, as I understand it, was purchased by the State in 1980 through a tax sale, but that was after the time of the physical dumping of the waste.

In any event, I was under instructions that no decisions could be made at any site until all sites on the national priority list had been reviewed from the standpoint of their ownership status. That involved 650 sites, most of which were not fully known until the September timeframe.

On December 8, the Administrator made a decision from a policy standpoint that sites such as Stringfellow would be regarded as 10 percent contribution sites. In the meantime we had negotiations underway with the responsible parties and it was my desire to see if those negotiations would prove fruitful, which they have not, before making any final decisions in terms of funding the site.

I was not involved and I have no knowledge of any of the political discussions or inuendoes that appear to be on this document that you have given me here.

Mr. HAYDEN. You, in October 1982, apparently were at a meeting in California after the decision had been made not to provide the funds for Stringfellow and one of the reasons given at that meeting, at least according to Dr. Stephens, who has now been fired, and Mrs. Newman, who testified earlier—one of the reasons given for the money not coming for Stringfellow was that a list of the

generators of the waste was not available. Do you recall that meeting?

Mr. HEDEMAN. A list of the generators of waste was not available?

Mr. HAYDEN. Not available. That was one of the reasons given by the Administrator.

Mr. HEDEMAN. Absolutely not. That is totally incorrect. Indeed, we had the most thorough list of generators and quantities of waste attributable to each of any case we have in this entire country at that point.

Mr. HAYDEN. That is my understanding, but my understanding of the meeting was that different representation was made.

Mr. HEDEMAN. Absolutely not and I will provide you my personal notes of the meeting to reflect the opposite view.

Mr. HAYDEN. OK. I just have one other brief question. Mr. Seraydarian, are you going to testify?

Mr. SERAYDARIAN. I am here to answer questions.

Mr. HAYDEN. I just had a question because there have been stories in the newspapers, and I am not prejudging truth or otherwise, but that a Mr. David Bower of the IT Corp. apparently came to you and made some exploratory offer of whether you were interested in the job that Mr. Stephens was just fired from. Would you care to comment and clarify that for us?

Mr. SERAYDARIAN. I would be happy to answer your question. I don't think it has anything to do with Stringfellow or EPA's R&D efforts.

Mr. HAYDEN. Well, it has to do with the State and the Federal programs and what they are going to be and we have had a cloud of rumor about manipulation for various gain and we can't have this continue. So, I just wondered if you could clarify that for us?

Mr. SERAYDARIAN. I would be happy to. I was called several months ago and asked if I was interested in working for the State again. I had worked for the State through 1981 under contract and I indicated that I wasn't interested.

Mr. HAYDEN. You were contacted by Mr. Bower?

Mr. SERAYDARIAN. Right.

Mr. HAYDEN. Thank you.

Mr. BROWN. Do I understand, Mr. Seraydarian, that you do not have a separate statement?

Mr. SERAYDARIAN. No.

Mr. BROWN. And does your other—are there any additional questions from any member of the hearing panel?

Senator Presley.

Mr. PRESLEY. It is not a question, but I think that one of the more important things that Mr. Hedeman has said here, especially in terms of the importance to this community, is keeping them informed. I think they really want that and you have indicated that that would be your plan. I commend you for that and I hope you follow through so that is done.

I just wanted to add that yesterday the attorney general—the California attorney general—in announcing his lawsuits also made the same promise to keep this community informed on a 30-to-60-day basis. So, I think with those two actions, I think we can look forward to and hope that the community is kept informed of the

progress and I think everybody will feel a lot better about it as we go along.

VOICE. Not being informed. Involved. There is a difference.

Mr. PRESLEY. Informed and involved.

Mr. BROWN. Would you like to comment, Mr. Hedeman, as to how you would feel about continuing to keep this community informed and involved about Stringfellow?

Mr. HEDEMAN. I will make the commitment that we will make every effort to not only keep them informed, but involved.

Mr. BROWN. Even if you have to go to another meeting like this.

Mr. HEDEMAN. That is right. I find in this program that this meeting is symptomatic of the public concern nationally with this problem and the expressions of concern that have come out of this meeting are not unique to Glen Avon. It is something that I think is something that all of us have to share in the sense of dealing with.

Penny Newman indicated that she met with the administrator last September and that the group that she was with presented a list of principles on public involvement. It would be my great pleasure to be able to say that the agency was in a position as a result of that meeting to present to her and to those representatives our response. Our response has been prepared and given the unfortunate situation at EPA in terms of the leadership, I have been unable to clear that. Whoever becomes my boss, as well as Mr. Ruckelshaus and whenever that occurs, I will discuss this with them in the sense of the whole issue of public involvement, share with them my recommendations in large part incorporating Mrs. Newman's views and I hope very much that the whole question of public involvement becomes one that is a very positive part of the Superfund program. [Applause.]

Mr. BROWN. Mr. Hayden has one brief additional question.

Mr. HAYDEN. To clarify your process, if in the course of consulting with the community groups you should come to a disagreement—the community group feels very strongly that you are pursuing the wrong path—how then does that issue get resolved?

Mr. HEDEMAN. It can be that I as the decisionmaker would personally meet with the community. In some cases the views of the EPA staff or the state staff, as well as the community staff, are summarized. They are reviewed by my staff in Washington that has actually no direct involvement in the situation and so can give me an objective overview, and again, if it becomes a point where I feel that the issue is of such concern, either myself or whoever is making the decision may elect to personally meet with the community before a final decision is made.

Ms. TANNER. Ladies and gentlemen, I want to tell you something about public involvement and community involvement. The very reason we are holding this meeting today, and this is certainly community involvement, is because Assemblyman Clute and Senator Presley asked me to have my committee have a hearing on this and certainly Congressman Brown representing you here came from Washington and is very concerned. This is the kind of thing we really do believe in and when Senator Presley and Assemblyman Clute asked my committee to come and hold this hearing, it

was in response to them and they are responding to you, of course. So, I do want you to understand that. [Applause.]

Mr. BROWN. Mr. Hedeman and Mr. Seraydarian, we very much appreciate your being here this afternoon. We know you both came a long way to be here, but I think it was extremely useful for both you and the community to have the opportunity to have this exchange in the community and I just want to express my personal appreciation to you for coming out here. That will be all from this panel. Thank you very much.

Mr. HEDEMAN. Thank you for the opportunity.

Mr. BROWN. Before we take a brief recess, I would like to recognize Penny Newman for 1 minute. [Applause.]

Ms. NEWMAN. Thank you, Congressman Brown. I wanted to clarify something. When we were cut off, all I wanted to do was to thank the committee for showing your support for us, for being willing to come and talk with this community, take our concerns into account and I am asking that you do something with the information that you get today.

I wanted to clarify and clear up the misunderstanding because I don't want my community to feel badly about you. I know we have had a very hard time with bureaucrats, with the Government officials, trying to work with them. Our only hope is you. We are just asking that you help us. Thank you. [Applause.]

Mr. BROWN. I still love Penny. There is no problem there.

We are going to take a 10-minute recess.

[Recess.]

Mr. BROWN. Please come to order.

The next panel will be two representatives of the State agencies involved in this and I would appreciate it if the audience would restrain their enthusiasm for these two witnesses. We will first ask Mr. Thomas Bailey, director of the Toxics Division of the State Department of Health Services to present his statement. Mr. Bailey.

STATEMENT OF THOMAS BAILEY, DIRECTOR, TOXICS DIVISION, CALIFORNIA DEPARTMENT OF HEALTH SERVICES

Mr. BAILEY. Thank you, Mr. Chairman, Assemblywoman Tanner, members of the committee. My name is Thomas E. Bailey. I am representing the State of California Department of Health Services, Toxic Substances Control Division. My position is Chief of the Site Cleanup and Emergency Response Section and Manager of the California Superfund Program.

Mr. Chairman, I have a prepared statement that I have submitted and with your approval its presentation and also the attachments will go into the record, please.

Mr. BROWN. Without objection, the full text of your statement will appear in the record and you may summarize or abbreviate in any way you wish.

Mr. BAILEY. Fine. Thank you.

Before I begin my comments that are in my prepared text, because of some of the issues that were raised in the previous comments, I do have three areas that I wish to address first. One is that the present administration of Governor Deukmejian is very concerned about toxics. He has made the statement that the prob-

lem of toxics and hazardous waste management in the State of California is of top priority. We have no intention of backing off from the comprehensive work plan that was developed for this site and the State of California will pursue a solution to this problem vigorously.

No. 2, the question that was raised because of the apparent problem in developing the epidemiological health effects study plan will be reviewed and, three, a comprehensive monitoring plan has been initiated by the department in January. We will continue that comprehensive monitoring program, both onsite, below the site and in the ground water area and the water supply systems of the community.

My comments will address issues relating to toxic substances control, hazardous waste management, remedial activities at abandoned and uncontrolled hazardous waste sites. Also, I will address specific questions relative to EPA's management of and philosophy toward hazardous waste site cleanup.

The management of toxic substances today, including control of air emissions, management of the generation, handling and disposal of toxic wastes, the evaluation and cleanup of hazardous waste sites, depends greatly on our understanding of the behavior of substances in the environment and the effects of these substances on the quality of the environment and on public health.

The intensity of the public concern which surrounds toxics relates to the fact that the public perceives that their health and well-being is directly affected. The most outspoken concern seems to be directed toward hazardous waste sites. This is because the sites can be seen, touched and smelled. The potential public health risks and environmental degradation associated with hazardous waste sites requires that we act aggressively and quickly with sound technical solutions. Our actions must be responsible. We must be able to allocate an amount of public and private resources appropriate to the seriousness of the problem. Even with hazardous wastes, some situations present greater risks than others.

I want to point out here, Mr. Chairman, that just—I want to draw the analogy, if I might, between the Federal Water Pollution Control Act funding and funding for Superfund. As you know, I am sure, the Federal Water Pollution Control Act requested an appropriation for next year of $2.4 billion. The request for Superfund under CERCLA is $310 million.

Mr. BROWN. Mr. Bailey, I am going to ask you if you feel that the amount of money requested—and I had intended to ask the previous witness the same question, but didn't—but do you feel that that is an adequate amount to continue with the program of the scope that appears to be necessary in this country at the present time?

Mr. BAILEY. I do not.

Mr. BROWN. Thank you.

Mr. BAILEY. As I pointed out, Mr. Chairman, with hazardous wastes, some situations present greater risks than others. Our problem is in making judgments. How are such judgments made? By necessity, they must be based upon a knowledge of what exists. An evaluation of the impacts of an abandoned site, such as the Stringfellow Quarry, or the design of an effective remedial solution

cannot be accomplished unless there is adequate knowledge of what substances exist, their quantity and their behavior in the environment.

The need to have this information prior to taking action creates one of the greatest frustrations in dealing with site cleanup. This is true for two reasons. First, such work is time consuming and expensive. Second, it is not direct cleanup of the hazardous waste site.

Because your focus is toward the science and technology of environmental problems, I point out two important facts about the characteristics of sites such as Stringfellow. Chemical wastes are by their nature composed of an almost infinite variety of substances, each with its own characteristics, behavior and potential environmental and public health impacts.

There are synergistic effects of the chemicals in waste sites and there are antagonistic effects, basically meaning it can get worse in a waste site or it can get better in a waste site. Typically, it doesn't get better.

The development of a reliable and complete data base on which to design and construct effective remedial works in most cases outstrips both public and private resources and, in specific cases, the analytical technology itself.

When, in 1979 and 1980, as an example, the State, in cooperation with the Federal Government attempted to characterize and solve the waste and ground water contamination problems surrounding the Occidental Chemical Plant at Lathrop, CA, most of the laboratory capability in the entire State was exhausted. As a result of these difficulties in characterization, estimates, extrapolations, and judgments are made. Not all judgments prove to be correct.

The second major problem in identifying an appropriate cleanup strategy is understanding the behavior and the movement of complex mixtures of chemical substances, particularly as in the case of Stringfellow and the underground environment. Our technical ability to predict such behavior is, at best, imprecise.

In the face of this uncertainty, we must still deal with hazardous waste sites, both operating and abandoned. Waste and sites must be managed and cleaned up. And I will say parenthetically in California they will be managed and cleaned up. Superimposed upon the general problems which I have mentioned, there is another difficult question. What should be the operational standards for land containment of chemicals?

California's approach to site cleanup is predicated on a criteria that protects public health and the environment in both the short term, during site cleanup, and in the long term for final cleanup. Attached to these comments for your use, as an example, is a site cleanup criteria we developed for the McColl site in Orange County. The criteria relates to protection of public health and the environment through control of levels of contamination of air, waters and soil.

These criteria relate to levels of odors, concentrations of organic and inorganic chemicals in the soil, limits of allowable air emissions for chronic and acutely toxic chemicals and for limits on potential contamination of surface waters and ground waters.

Also attached is a copy of a comprehensive approach to selecting the best remedial solution for site cleanup.

There are two possible strategies. One, controlled discharge with management of substances and, two, containment without discharge. Standards for land disposal of toxic chemicals in California are based upon total containment. Consistent with this standard, California is implementing a policy for the cleanup of uncontrolled hazardous waste sites of zero discharge. I want to emphasize here that that is our goal.

Therefore, the operational standards are such that a waste site must be cleaned up; that is, treated to a level where residues no longer are characterized as a hazardous waste. The alternative is that the site must be brought to the standard of a hazardous waste facility that can be secured to prevent or minimize public health and environmental risks.

And I want to say parenthetically here the only reason I have the word "minimize" in this prepared text is because in the case of Stringfellow we have a contaminated plume that is already below a site that we feel that we can adequately contain; that is, the most immediate pressing issue facing us at Stringfellow is identifying the full nature and extent of the contaminated plume and managing that plume so that it does not, in fact, go below where it is now in terms of affecting the drinking water supply and the ground water basin.

California has expended considerable effort to evaluate the appropriateness of land disposal of certain highly toxic, mobile, and persistent substances. We have as an alternative opted to promote the development of waste treatment technology and restrict the use of land disposal as an environmentally sound management strategy.

These same substances, restricted from land disposal by new regulations, are often found in old abandoned sites. In order to avoid the re-creation of future uncontrolled sites, we will as a top priority evaluate and consider alternative technologies, including the treatability of the chemical substances existing at or removed from these old sites in preference to redisposal to the land. Our immediate problem is that adequate alternatives to redisposal are not now readily available.

And, again, I want to parenthetically add here that because of your interest in the science and technology issues of site cleanup, I want to comment a little bit about the remedial actions and the technology needs that we see.

We know that there are adverse effects of contaminants on containment structures. These are caused by acids and solvents and metals that all require different types of treatment technologies. There is the treatment of complex and variable wastes, incineration of solids, chemical fixation and destruction are all alternatives that are not now proven and online for solution of site cleanup problems. Buried sumps, buried pits and the hydrogeological and geological issues related to the site cleanup have to be resolved. We have found in California that a major issue that we have is, in fact, finding the full extent and problem associated with what is buried underground.

Last, analytical techniques are needed to identify the constituents. I use as an example tetrahydrothiapene, which is odorous, meaning that the public, all of us, can smell it in very minute quantities. The analytical instruments that we have today can only determine the concentration of those materials at orders of magnitude higher than we can smell them. Therefore, when the public says they can smell something and there is an effect, in fact, it is not fair in some cases, especially with tetrahydrothiapene, for a scientific test and an analytical result to come by and say it doesn't exist. It exists. It has not been measured.

Before I conclude, I want to address another part of this entire issue. A major element of addressing the cleanup of hazardous waste sites is public participation. In California, we are committed to developing an active relationship with the public and those in the technical and scientific roles of finding solutions.

At each site where there are impacts on local citizens, a public participation program will be pursued. California's site cleanup program provides for public review and comment on issues related to developing cleanup criteria, to evaluating cleanup alternatives, to selecting and designing the best solution and to actual site cleanup. We expect that the Federal Government, through EPA, can and will be equally committed to public participation.

In that regard we have included in our draft cooperative agreement to EPA, which requests funding for this site, a request for funding a significant public participation program. [Applause.]

To conclude these remarks, I want to address a few comments to the issue of Superfund management as a responsive program of environmental action. In our opinion, to be responsive, EPA should, one, allow the States to proceed with cleanup and agree to support State efforts through reimbursement and/or early approval of projects. Two, delegate decisionmaking to the regional level in order that more timely actions can be taken. Three, agree to support a State through final project completion. With respect to Stringfellow, I must make three points.

One, presently, there may be a problem that exists in Washington with respect to approval of our cooperative agreement because of their concern that they cannot commit to a final solution.

Two, EPA verbally is dictating to the State that the State cannot now spend money, its own or EPA's, in pumping ground water from the contaminated plume in order to manage that plume until the feasibility studies are complete. We are not saying at this time that is a bad choice, but we are saying that should be the choice of the State of California to protect the public and we intend to do that and we don't expect that that will jeopardize the cooperative agreement.

Four, EPA can establish public health and environmental protection criteria and/or site cleanup design criteria that is aimed at keeping toxics from degrading our environment.

Five, EPA can develop an enforcement process that (a) does not delay cleanup and (b) does not exclude the public from the process of reaching a solution to site cleanup.

Before I conclude, Mr. Chairman, I want to make one more comment. This administration has just recently submitted for consideration to Assemblywoman Tanner and to Assemblyman Komnyu a

package of draft Superfund amendment legislation, the State Superfund. The administration has endorsed that package. That legislation, when passed, will allow us in California to pursue vigorous site cleanup without first identifying responsible parties and having to go through the enforcement mode first. We can then take what is called a dual track. We can pursue enforcement and site cleanup in parallel.

Second, it will allow us to have site access in a more timely manner for remedial action in site cleanup, which we do now not have without a lengthy judicial process.

Third, it will improve the contracting process and, fourth, it establishes an operation and maintenance account for the long-term maintenance of sites that cannot be totally removed and trucked off to another location.

In conclusion, I have in this statement attempted to address some of the difficulties in characterizing and assessing the impact of sites such as Stringfellow in devising an effective remedial strategy and in formulating approaches to defining a cleanup criteria. I have mentioned a few ideas that could enhance our abilities to respond to site cleanup more aggressively and with significant public participation.

It is clear that there are still many uncertainties in this new area of science and technology. It is equally clear that we in California are beyond our technical and financial resources to deal with these problems. We must rely on substantial support from the Federal Government and from the national research institutions if we are to effectively and responsibly address the problems.

Thank you for this opportunity. If there are any questions, I will be glad to answer them.

[The prepared statement of Mr. Bailey, with attachments follow:]

39-743 0 - 85 - 8

STATEMENT BEFORE THE JOINT CONGRESSIONAL/LEGISLATIVE HEARING ON THE EPA SUPERFUND PROGRAM, RIVERSIDE COUNTY, APRIL 22, 1983

MR. CHAIRMAN, ASSEMBLYWOMAN TANNER, MEMBERS OF THE COMMITTEE, MY NAME IS THOMAS E. BAILEY. I AM REPRESENTING THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES, TOXIC SUBSTANCES CONTROL DIVISION. MY POSITION IS CHIEF, SITE CLEANUP & EMERGENCY RESPONSE SECTION AND MANAGER OF THE CALIFORNIA SUPERFUND PROGRAM. MY COMMENTS WILL ADDRESS ISSUES RELATING TO TOXIC SUBSTANCES CONTROL, HAZARDOUS WASTE MANAGEMENT, AND REMEDIAL ACTIVITIES AT ABANDONED AND UNCONTROLLED HAZARDOUS WASTE SITES. ALSO, I WILL ADDRESS SPECIFIC QUESTIONS RELATIVE TO EPA'S MANAGEMENT OF AND PHILOSOPHY TOWARD HAZARDOUS WASTE SITE CLEANUP.

YOUR LETTER OF INVITATION TO DIRECTOR DAWSON INDICATED THAT YOUR INTEREST IS IN THE SCIENTIFIC AND TECHNICAL ISSUES AS THEY RELATE TO EVALUATION OF HAZARDOUS WASTE SITES, DESIGN OF REMEDIAL WORKS AND THE ESTABLISHMENT OF CLEANUP CRITERIA. ADDITIONALLY, INTEREST WAS EXPRESSED IN THE RELATIONSHIP OF SITE CLEANUP ACTIVITIES TO THE NEWLY ADOPTED REGULATIONS RESTRICTING LAND DISPOSAL OF CERTAIN WASTES. THESE PREPARED REMARKS ADDRESS THESE POINTS.

THE MANAGEMENT OF TOXIC SUBSTANCES TODAY, INCLUDING CONTROL OF AIR EMISSIONS; MANAGEMENT OF THE GENERATION, HANDLING, AND DISPOSAL OF TOXIC WASTES; AND THE EVALUATION AND CLEANUP OF HAZARDOUS WASTE SITES, DEPENDS GREATLY ON OUR UNDERSTANDING OF THE BEHAVIOR OF SUBSTANCES IN THE ENVIRONMENT AND THE AFFECTS OF THESE SUBSTANCES ON THE QUALITY OF THE ENVIRONMENT AND ON PUBLIC HEALTH. THE INTENSITY

OF THE PUBLIC CONCERN WHICH SURROUNDS TOXICS ISSUES RELATES TO THE FACT THAT THE PUBLIC PERCEIVES THAT THEIR HEALTH AND WELLBEING IS DIRECTLY AFFECTED. THE MOST OUTSPOKEN CONCERN SEEMS TO BE DIRECTED TOWARD HAZARDOUS WASTE SITES. THIS IS BECAUSE THE SITES CAN BE SEEN, TOUCHED, AND SMELLED. THE POTENTIAL PUBLIC HEALTH RISKS AND ENVIRONMENTAL DEGRADATION ASSOCIATED WITH HAZARDOUS WASTE SITES REQUIRES THAT WE ACT AGGRESSIVELY AND QUICKLY WITH SOUND TECHNICAL SOLUTIONS. OUR ACTIONS MUST BE RESPONSIBLE. WE MUST BE ABLE TO ALLOCATE AN AMOUNT OF PUBLIC AND PRIVATE RESOURCES APPROPRIATE TO THE SERIOUSNESS OF THE PROBLEM. EVEN WITH HAZARDOUS WASTES, SOME SITUATIONS PRESENT GREATER RISKS THAN OTHERS.

HOW ARE SUCH JUDGEMENTS MADE? BY NECESSITY THEY MUST BE BASED UPON A KNOWLEDGE OF WHAT EXISTS. AN EVALUATION OF THE IMPACTS OF AN ABANDONED SITE SUCH AS THE STRINGFELLOW QUARRY OR THE DESIGN OF AN EFFECTIVE REMEDIAL SOLUTION CANNOT BE ACCOMPLISHED UNLESS THERE IS ADEQUATE KNOWLEDGE OF WHAT SUBSTANCES EXIST, THEIR QUANTITY AND THEIR BEHAVIOR IN THE ENVIRONMENT. THE NEED TO HAVE THIS INFORMATION PRIOR TO TAKING ACTION CREATES ONE OF THE GREATEST FRUSTRATIONS IN DEALING WITH SITE CLEANUP. THIS IS TRUE FOR TWO REASONS: FIRST, SUCH WORK IS TIME CONSUMING AND EXPENSIVE; SECOND, SUCH WORK IS NOT DIRECTLY A CLEANUP OF THE SITE.

BECAUSE YOUR FOCUS IS TOWARD THE SCIENCE AND TECHNOLOGY OF ENVIRONMENTAL PROBLEMS, I POINT OUT TWO IMPORTANT FACTS ABOUT THE CHARACTERIZATION OF SITES SUCH AS STRINGFELLOW. CHEMICAL WASTES ARE BY THEIR NATURE COMPOSED OF AN ALMOST INFINITE VARIETY OF SUBSTANCES,

EACH WITH ITS OWN CHARACTERISTICS, BEHAVIOR, AND POTENTIAL ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS. THE DEVELOPMENT OF A RELIABLE AND COMPLETE DATA BASE ON WHICH TO DESIGN AND CONSTRUCT EFFECTIVE REMEDIAL WORKS IN MOST CASES, OUTSTRIPS BOTH PUBLIC AND PRIVATE RESOURCES, AND IN SPECIFIC CASES, THE ANALYTICAL TECHNOLOGY ITSELF.

WHEN IN 1979 AND 1980, THE STATE, IN COOPERATION WITH THE FEDERAL GOVERNMENT ATTEMPTED TO CHARACTERIZE, AND SOLVE THE WASTE AND GROUNDWATER CONTAMINATION PROBLEMS SURROUNDING THE OCCIDENTAL CHEMICAL PLANT AT LATHROP, CALIFORNIA, MOST OF THE LABORATORY CAPABILITY IN THE STATE WAS EXHAUSTED. AS A RESULT OF THESE DIFFICULTIES IN CHARACTERIZATION, ESTIMATES, EXTRAPOLATIONS, AND "JUDGEMENTS" ARE MADE. NOT ALL SUCH JUDGEMENTS PROVE TO BE CORRECT.

THE SECOND MAJOR PROBLEM IN IDENTIFYING AN APPROPRIATE CLEANUP STRATEGY IS UNDERSTANDING THE BEHAVIOR AND THE MOVEMENT OF COMPLEX MIXTURES OF CHEMICAL SUBSTANCES, PARTICULARLY IN THE UNDERGROUND ENVIRONMENT. OUR TECHNICAL ABILITY TO PREDICT SUCH BEHAVIOR IS AT BEST IMPRECISE.

IN THE FACE OF THIS UNCERTAINTY, WE MUST STILL DEAL WITH HAZARDOUS WASTE SITES, BOTH OPERATING AND ABANDONED. WASTES AND SITES MUST BE MANAGED AND CLEANED UP. SUPERIMPOSED UPON THE GENERAL PROBLEMS WHICH I HAVE MENTIONED, THERE IS ANOTHER DIFFICULT QUESTION. WHAT SHOULD BE THE OPERATIONAL STANDARDS FOR LAND CONTAINMENT OF CHEMICALS?

CALIFORNIA'S APPROACH TO SITE CLEANUP IS PREDICATED ON A CRITERIA THAT PROTECTS PUBLIC HEALTH AND THE ENVIRONMENT IN THE SHORT TERM DURING THE SITE CLEANUP, AND IN THE LONG TERM FOR FINAL CLEANUP. ATTACHED TO THESE COMMENTS FOR YOUR USE AS AN EXAMPLE, IS A SITE CLEANUP CRITERIA WE DEVELOPED FOR THE McCOLL SITE, ORANGE COUNTY. THE CRITERIA RELATE TO PROTECTION OF PUBLIC HEALTH AND THE ENVIRONMENT THROUGH CONTROL OF LEVELS OF POTENTIAL CONTAMINATION OF AIR, WATER, AND SOIL. THESE CRITERIA RELATE TO LEVELS OF ODORS, CONCENTRATIONS OF ORGANIC AND INORGANIC CHEMICALS IN THE SOIL, LIMITS ON ALLOWABLE AIR EMISSIONS FOR CHRONIC AND ACUTELY TOXIC CHEMICALS, AND FOR LIMITS ON POTENTIAL CHEMICAL CONTAMINATION OF SURFACE WATERS AND GROUNDWATERS.
ALSO, ATTACHED IS A COPY OF A COMPREHENSIVE APPROACH TO SELECTING THE BEST REMEDIAL SOLUTION FOR SITE CLEANUP.

THERE ARE TWO STATEGIES POSSIBLE. CONTROLLED DISCHARGE WITH MANAGEMENT OF SUBSTANCES AND CONTAINMENT WITHOUT DISCHARGE. STANDARDS FOR LAND DISPOSAL OF TOXIC CHEMICALS IN CALIFORNIA ARE BASED UPON TOTAL CONTAINMENT. CONSISTENT WITH THIS STANDARD, CALIFORNIA IS IMPLEMENTING A POLICY FOR THE CLEANUP OF UNCONTROLLED HAZARDOUS WASTE SITES OF ZERO DISCHARGE. THEREFORE, THE OPERATIONAL STANDARDS ARE SUCH THAT A WASTE SITE MUST BE CLEANED UP, THAT IS, TREATED TO A LEVEL WHERE RESIDUES NO LONGER ARE CHARACTERIZED AS A HAZARDOUS WASTE. THE ALTERNATIVE IS THAT THE SITE MUST BE BROUGHT TO THE STANDARD OF A HAZARDOUS WASTE FACILITY AND BE SECURED TO PREVENT OR MINIMIZE PUBLIC HEALTH AND ENVIRONMENTAL RISKS. CALIFORNIA HAS

EXPENDED CONSIDERABLE EFFORT TO EVALUATE THE APPROPRIATENESS OF THE LAND DISPOSAL OF CERTAIN HIGHLY TOXIC, MOBILE, AND PERSISTENT SUBSTANCES.

WE HAVE AS AN ALTERNATIVE, OPTED TO PROMOTE THE DEVELOPMENT OF WASTE TREATMENT TECHNOLOGY AND RESTRICT THE USE OF LAND DISPOSAL AS AN ENVIRONMENTALLY SOUND MANAGEMENT STRATEGY. THESE SAME SUBSTANCES, RESTRICTED FROM LAND DISPOSAL BY THE NEW REGULATIONS, ARE OFTEN FOUND IN THE OLD, ABANDONED SITES. IN ORDER TO AVOID THE RE-CREATION OF FUTURE UNCONTROLLED SITES, WE WILL AS A TOP PRIORITY EVALUATE AND CONSIDER ALTERNATIVE TECHNOLOGIES, INCLUDING THE TREATABILITY OF THE CHEMICAL SUBSTANCES EXISTING AT OR REMOVED FROM THESE OLD SITES IN PREFERENCE TO REDISPOSAL TO THE LAND. OUR IMME-DIATE PROBLEM IS THAT ADEQUATE ALTERNATIVES TO REDISPOSAL ARE NOT NOW READILY AVAILABLE.

BEFORE I CONCLUDE, I WANT TO ADDRESS ANOTHER PART OF THIS ENTIRE ISSUE. A MAJOR ELEMENT OF ADDRESSING THE CLEANUP OF HAZARDOUS WASTE SITES IS PUBLIC PARTICIPATION. IN CALIFORNIA, WE ARE COMMITTED TO DEVELOPING AN ACTIVE RELATIONSHIP BETWEEN THE PUBLIC AND THOSE IN THE TECHNICAL AND SCIENTIFIC ROLES OF FINDING SOLUTIONS. AT EACH SITE WHERE THERE ARE IMPACTS ON THE LOCAL CITIZENS, PUBLIC PARTICIPATION PROGRAM WILL BE PURSUED. CALIFORNIA'S SITE CLEANUP PROGRAM PROVIDES FOR PUBLIC REVIEW AND COMMENT ON THE ISSUES RELATED TO DEVELOPING CLEANUP CRITERIA, TO EVALUATING CLEANUP ALTERNATIVES , TO SELECTING AND DESIGNING THE BEST SOLUTION AND TO ACTUAL SITE CLEANUP. WE EXPECT THAT THE FEDERAL

GOVERNMENT THROUGH EPA CAN AND WILL BE EQUALLY COMMITTED TO PUBLIC PARTICIPATION.

TO CONCLUDE THESE REMARKS I WANT TO ADDRESS A FEW COMMENTS TO THE ISSUE OF SUPERFUND MANAGEMENT AS A RESPONSIVE PROGRAM OF ENVIRONMENTAL ACTION. TO BE RESPONSIVE, EPA SHOULD:

1. ALLOW THE STATES TO PROCEED WITH CLEANUP AND AGREE TO SUPPORT STATE EFFORTS THROUGH REIMBURSEMENT AND/OR EARLY APPROVAL OF PROJECTS.

2. DELEGATE DECISION MAKING TO THE REGIONAL LEVEL IN ORDER THAT MORE TIMELY ACTIONS CAN BE TAKEN.

3. AGREE TO SUPPORT A STATE THROUGH FINAL PROJECT COMPLETION.

4. ESTABLISH PUBLIC HEALTH AND ENVIRONMENTAL PROTECTION CRITERIA AND/OR SITE CLEANUP DESIGN CRITERIA THAT IS AIMED AT KEEPING TOXICS FROM DEGRADING OUR ENVIRONMENT.

5. DEVELOP AN ENFORCEMENT PROCESS THAT A) DOES NOT DELAY CLEANUP AND B) WILL NOT EXCLUDE THE PUBLIC FROM THE PROCESS OF REACHING A SOLUTION TO SITE CLEANUP.

I HAVE IN THIS STATEMENT ATTEMPTED TO ADDRESS SOME OF THE DIFFICULTIES IN CHARACTERIZING AND ASSESSING THE IMPACT OF SITES SUCH AS STRINGFELLOW, IN DEVISING AN EFFECTIVE REMEDIAL STRATEGY, AND IN FORMULATING APPROACHS TO DEFINING A CLEANUP CRITERIA AND I HAVE MENTIONED A FEW IDEAS THAT COULD ENHANCE OUR ABILITIES TO RESPOND TO SITE CLEANUP MORE AGGRESSIVELY AND WITH SIGNIFICANT PUBLIC PARTICIPATION. IT IS CLEAR THAT THERE ARE STILL MANY UNCERTANTIES IN THIS NEW AREA OF SCIENCE AND TECHNOLOGY. IT IS EQUALLY CLEAR THAT WE, IN CALIFORNIA, ARE BEYOND OUR TECHNICAL AND FINANCIAL RESOURCES TO DEAL WITH THESE PROBLEMS. WE MUST RELY ON SUBSTANTIAL SUPPORT FROM THE FEDERAL GOVERNMENT AND THE NATIONAL RESEARCH INSTITUTIONS IF WE ARE TO EFFECTIVELY AND RESPONSIBLY ADDRESS THESE PROBLEMS. THANK YOU FOR THIS OPPORTUNITY. I WOULD BE HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE.

McCOLL CLEAN-UP CRITERIA

	MEDIUM	*SHORT-TERM*	*LONG-TERM*
WATER	Ground Water	Minimize standing water	No ground-water flow into site/waste Minimize standing water No contamination of ground water Compliance with RCRA
	Surface Water	No contaminated runoff	No contaminated runoff
AIR	Odor	Control measures to minimize odors on site and during off-site transport	No detectable odors at site boundary
	SO_2	No violation of state ambient air standards	No increase above background
	Benzene	Maintain emissions below no adverse response level	No increase above background
SOIL/WASTE	Total Excavation Alternative	Remove all hazardous wastes and contaminated soils No releases during excavation or transport	
	"In-site" Alternatives		No migration of wastes or waste constituents Protection against releases due to highest probable seismic event

DOHS McCOLL CLEAN-UP CRITERIA

Medium	Short-Term	Long-Term
WATER		
Ground Water	• Minimize standing water	• No migration of ground water into the site/waste. • Minimize standing water. • No statistically significant measurable increase over background concentrations for those constituents which are attributed solely to the site.[2] • Implementation of applicable requirements of RCRA, Part 264.
Surface Water	• No run-off of sediments and water from the site which contain the following constituents in excess of: benzene, 250 ug/l; toluene, 35 mg/l; total xylene, 1.4 mg/l; arsenic, 50 ug/l; sulfates, 250 mg/l; or pH, 5.5-8.5 (unless the pH of off-site run-off exceeds this range)[1]	• No run-off of sediments or water from the site which contain detectable levels of any constituents which are attributed solely to the site.
AIR		
Odor	• Control measures will be implemented to maintain odor levels below an appropriate threshold level to be established using the SCAQMD's "Odor Monitoring Plan, McColl Site, Fullerton." • Odor control measures will be implemented to reduce the release of odors during off-site transportation of any wastes.	• The site shall not emit odors above SCAQMD's numerical intensity level of 2 when measured directly above the sump(s) and not above the numerical intensity level of 0 (no detectable site odor) at any point on the existing boundary.[3]
SO_2	• 24-hour time weighted average (TWA) SO_2 concentration of 0.05 ppm shall not be exceeded. • 1-hour TWA SO_2 concentration of 0.1 ppm shall not be exceeded. • 5-minute TWA SO_2 concentration of 0.5 ppm shall not be exceeded.[4,5]	• No statistically significant measurable SO_2 concentration increase between the downwind and upwind monitoring locations.[5]
Benzene	• The downwind instantaneous fence-line trigger level for benzene will be 2.0 ppm for a meteorological stability class of "D" and a 100-foot dilution distance.[5,6]	• No statistically significant measurable benzene concentration increase between the downwind and upwind monitoring locations.[5]
SOLID WASTE		
Total Excavation Alternative	• Remove all hazardous wastes and all obviously contaminated soils. This includes soils/waste with pH less than or equal to 2 and soils/waste with arsenic at or above hazardous concentrations.[7,8] • No erosion/spillage or air emissions (fugitive particulates) of contaminated material off of the site during site activity of off-site waste/soil transportation.	
"In-situ" Alternatives		• No vertical/lateral migration of wastes or waste constituents. • Protected against releases due to the highest probable seismic activity level for the area.

DOHS McCOLL CLEAN-UP CRITERIA (Continued)

Footnotes:

[1]The constituents were selected on the basis of their presence in previous on-site run-off samples. The concentration limits are: the drinking water standards for arsenic and sulfates; the 7-day Suggested No Adverse Response Level (SNARL) for benzene* and toluene**; and the 10-day SNARL for total xylene***.

[2]Operational compliance procedures for this criteria will be developed as part of the site closure and monitoring plan (SCMP).

[3]Operational compliance procedures for this criteria will be determined by the SCAQMD and monitored on a frequency established in the SCMP.

[4]The limits are established to prevent site activity air emissions from violating the State ambient air standards for SO_2.

[5]The location of the upwind and downwind site boundary monitoring stations shall be dynamic. The designation of which stations are upwind and which are downwind will be made according to real-time meteorological conditions.

[6]The 100-foot dilution distance to adjacent residences and meteorological stability class "D" conditions are worst-case conditions. Actual dilution distances for various wind directions will be measured for each monitoring station. Various trigger levels will be calculated for each station for all dilution distance and for each of the meteorological stability classes. The intent of the short-term benzene criteria is to provide protection below the one-in-one million cancer risk level as related to site activities. A twenty-fold safety factor is included.

[7]The definition of hazardous wastes is contained in Chapter 6.5, Article 1, Section 25117 of the Hazardous Waste Control Law of the Health and Safety Code, Division 20. For any chemical found at the site and listed in the California Assessment Manual (CAM), the definition of whether that particular chemical is hazardous or non-hazardous will be determined by the concentration limit/cut-off specified in CAM.

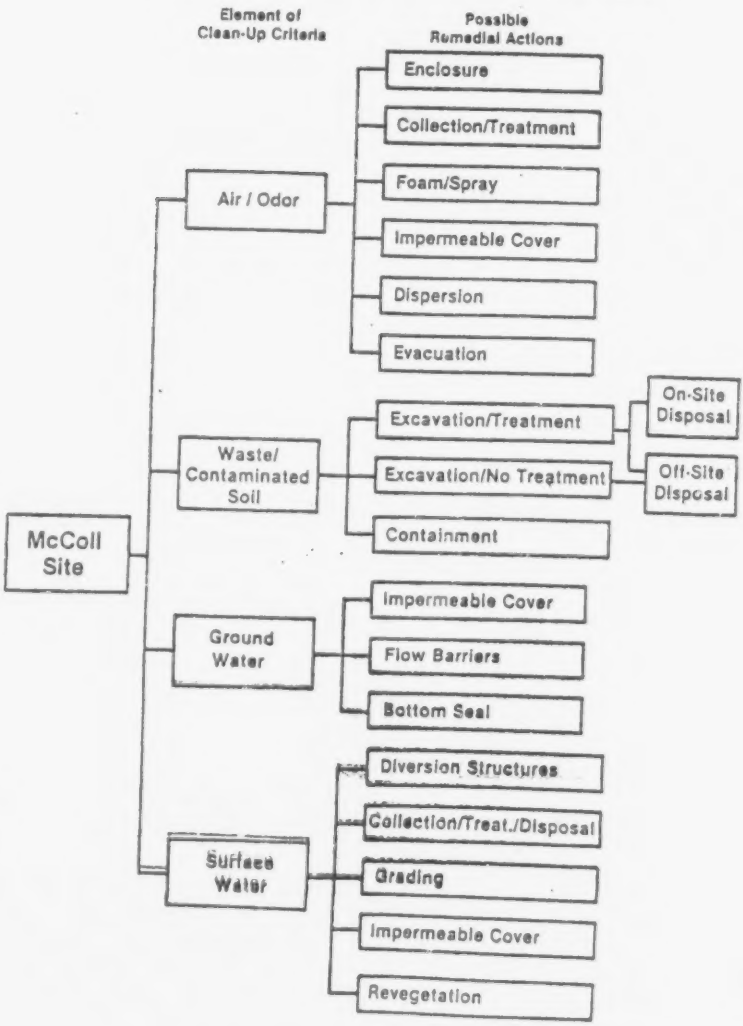
[8]The determination of whether soils are "obviously contaminated" will be made by the DOHS on-site representative and will include such factors as pH, color, and physical state.

* Drinking Water and Health, Vol. 4, National Academy of Sciences (NAS), 1982

** Drinking Water and Health, Vol. 3, NAS, 1980

*** EPA Water Quality Criteria Documents, 1982

APPROACH TO REMEDIAL ACTION EVALUATION



Mr. BROWN. Thank you very much, Mr. Bailey.

I am going to ask Mr. Anderson to make a brief statement first and then we will question both of you.

We have your written statement, Mr. Anderson, which responds to certain questions that we asked and this will be made a part of the record in full.

I would like to ask you to take a few minutes to either amplify on this or to comment on any of the other matters which have come up during the course of the hearing where you might feel a comment from you would be appropriate at this time, if you would like to do that.

STATEMENT OF JAMES ANDERSON, EXECUTIVE OFFICER, SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD, RIVERSIDE, CA

Mr. ANDERSON. Thank you, Mr. Chairman. Just as a sidelight then, I would like to point out a couple of things.

In my statement I talk about the staff at region 9. I have not dealt personally and practically with the staff in Washington EPA. On several occasions staff at region 9 have worked with us to prepare documents for Superfund. They have put in extremely long hours and I think with all the national attention of what happened in Washington with the eventual Superfund allocation, none of this seems to be applicable to the people in region 9 who worked with us very diligently and extremely well.

The lack of funding did make several decisions with respect to Stringfellow more difficult. We thought we could do the job originally for $370,000. Before that legislation was in place that was sponsored by Senator Presley, we were flooded in 1978. That increased the cost. By the time we actually got the work started, inflation had even jumped on that. So, we were delayed considerably.

By 1980, the regional board held hearings on six alternatives and chose that the best alternative was to totally remove the waste from the site. At that time it was indicated that possibly EPA would find funding for the alternatives selected by the regional board. That was not available from any source.

Section 311 of the Federal Clean Water Act only provided emergency relief. We were able to obtain about $4 million from the State Clean Water Bond Act and were able then to implement the interim actions and abate the site or put it in a stable condition that you saw today.

As practical matters, I would just like to make these suggestions. Cuts in funding for environmental regulatory staff should not continue. We are losing expertise from our present staff throughout the State. The normal contracting procedures by the State add months to the work needed to be done at these sites.

Senator Presley was able to get special legislation that provided exemptions from many of these procedures. Otherwise, we would probably still be in the contracting process during this year's heavy rains and potential washout of waste this year.

I believe that the Federal and State requirements for expenditure of Superfund should be streamlined to use the State contracting procedures. Those are the procedures the people actually using

the money are most familiar with. We lost in an audit from a grant $12,382 because we didn't follow Federal contracting procedures when the work was exactly the same whether we used the Federal procedure or the State procedures. We were used to the State procedures and went with a contract based upon those processes. Federal auditors objected to at least this amount of money, which we returned to the fund.

If these three elements can be put in place from a practical standpoint, I think the expenditure of Superfund would be much better used in the State for all sites, including Stringfellow.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Anderson follows:]

STATEMENT OF

JAMES W. ANDERSON
EXECUTIVE OFFICER

SANTA ANA REGIONAL BOARD*

I am James Anderson, Executive Officer of the Santa Ana Regional Board. The Regional Board has been instrumental in the activities at the Stringfellow Class I site since its inception in 1954. These activities were described this morning. As part of this hearing, I would like to respond to the questions from Congressmen Scheur and Brown and present some suggestions for improving the response to toxic waste site matters.

1. Do the states receive appropriate guidance for cleaning up sites like Stringfellow?

   The Santa Ana Regional Board did not receive much guidance in the work we did at the site. This was probably because our work predated the time when other organizations had experience in these matters for them to provide guidance. We did call on whatever resources were available from the state, federal and local agencies. From time to time, these agencies provided suggestions and critiques of our plans and actions. In general, I believe that the work of the Regional Board and our consultants provided an effective job of stabilizing the site. We agree that additional work is still needed to completely make the site safe and operational. However, that work can now proceed without the imminent threat of washout of toxic waste.

2. Do you feel that the technical support from the state or federal government is sufficient?

   We received some technical support from the EPA Cincinnati office to help us evaluate the proposals for chemically fixing the waste materials. In addition, the on-scene assistance of the EPA "Strike Team" prevented further discharge of waste in 1980. Both provided excellent technical and practical support. The EPA Region IX consultants and technical staff have also provided some assistance to us in reviewing our work. Without exception the staff work by EPA Region IX has been of great help on this problem. They have worked diligently for long hours to provide quick response in time of emergency and to prepare many of the documents needed for the Super Fund application. With all of the national attention given to the Super Fund allocation for Stringfellow, there should be some special appreciation for the very hard work these people put in on this case.

*Before the US Congress Subcommittee on Natural Resources Agriculture Research and Environment and the State Assembly Committee on Consumer Protection and Toxic Materials - April 22, 1983

3. How has the lack of funds constrained your work and decisions regarding clean up of the Stringfellow Acid Pits?

The initial studies on a "closure plan" for the Stringfellow Site indicated that the costs would be about $370,000. Because this money was not immediately available, the site was open to flood water in 1978. The increased liquid in the pits and inflation made this early estimate too low by the time the appropriation legislation by Senator Presley was signed. The appropriation did allow us to better investigate the site and explore other possibilities, while making emergency repairs.

In 1980, the Regional Board selected a clean up alternative to totally remove the waste. It soon became clear that there was no source of money for the estimated $20-40 Million cost. The special legislation and the State Clean Up and Abatement Account were inadequate for this purpose. Federal sources at this time only provided for emergency response From Section 311 of the Clean Water Act. The $4 Million grant from the Clean Water Bond Act of 1978 allowed us to proceed with an "Interim Abatement Alternative" pending future decisions on federal and state Super Fund legislation.

Work on the site at many times was modified, held up or stopped because of budget problems and funding sources. The "Interim Abatement Alternatives" will need to be augmented using Super Fund because all the desired work was over our budget limit. However, the eventual reimbursement of some of the State funds should provide for the augmentation work and operation capital. In addition, the return of this money will provide resources to help clean up other sites.

Specifically, I would request that the Committee consider the following suggestions:

1. We will continue to need adequate staff to investigate, monitor and take actions on pollution problems. We have some severe constraints due to the loss of trained personnel and the ability to hire and maintain staff expertise. Budget constraints on travel make it difficult to get staff into the field to investigate these matters.

2. Exception to normal contracting procedures are needed because state and federal requirements add months to the ability to get contractors on the site. Senator Presley was able to get special legislation and exemption to the contract process for Stringfellow. I believe that without that exemption we could not have spent funds quickly enough to beat this year's heavy rains. Had the site been in the 1978 condition or under construction this year, significant amounts of waste material would have washed out of the site.

3. Federal and state requirements for the expenditure of funds needs to be streamlined to get money spent. In auditing our federal RCRA grant for $95,000, the auditor disallowed $12,392 because the state method of contracting was different than the federal requirements. Either method would have obtained the same amount of work for the same price. If possible, the State system should be used, as this is the best understood system for those actually using the money.

I hope this testimony is helpful to the Committee.

Mr. BROWN. Thank you, Mr. Anderson.

Ms. Tanner.

Ms. TANNER. Mr. Bailey, on the cooperative agreement, has the EPA signed a cooperative agreement with the State as yet?

Mr. BAILEY. No; they haven't, Ms. Tanner. We have yet to submit the cooperative agreement because only recently did we finally get the guidance from Washington that would be able to put it in a format in which they would approve it.

Mr. BROWN. Congressman McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

I would like to ask Mr. Bailey, if I may, a couple of questions. Testimony earlier in the day led me to believe that the scope, the general overall configuration of the contaminated area had not been completely identified to the extent that a sound and longlasting mitigation could take place and that more study in order to accomplish that objective is going to be necessary and I am wondering if you would care to comment on that?

Mr. BAILEY. That is a correct perception. This site has been studied extensively. It is a very significant problem, but the first work that we want to do is to complete the engineering feasibility study on the plume, which is the contaminated water that is presently below the site, meaning down gradient toward the groundwater basin.

There are two additional engineering feasibility studies that must be completed. One relates to the springs and the water that is flowing from above the site through the site presently and the second major—and I emphasize "major"—feasibility study will be looking at the work that has to be done to secure that site. We have recommended to EPA, and to the best of my knowledge they have agreed to fund at this time scope of work that will look at the unneutralized waste that is on site from three areas. One is possible neutralization. Second is possible encapsulation to secure it from the environment. Third is the possibility of removing it.

In addition to that, we have already stated that we know that the interim abatement program that was implemented is not enough for final site closure under either State requirements or RCRA. We intend to upgrade those. If everything stays the way it is now, we know that the barrier dam is going to have to be upgraded, the clay cap will have to be upgraded. We know that the gel injection system that has been put in place will have to be improved.

The interim abatement program was not meant to be a final solution. We have not accepted it as such. So, the engineering studies must be done.

Mr. MCCANDLESS. Can I take it from these comments that there is general agreement on both the State and on the EPA on the direction in which to proceed?

Mr. BAILEY. Yes.

Mr. MCCANDLESS. So, we won't have to reinvent that wheel, so to speak?

Mr. BAILEY. That is right.

Mr. MCCANDLESS. Thank you. The other comment I have, if I may, Mr. Chairman, deals more with our respective daily assignments and that is in the area of science and technology. Mr. Bailey,

if you were sitting up here, as we are, and using some of your comments as a beginning point, in page 3 of your prepared remarks, you talked about understanding the behavior and the movement of complex mixtures of chemical substances, particularly in the underground environment and then you go on to say, "Our technical ability to predict such behavior is, at best, imprecise," which is certainly something that is not unique to this project or problem and can be applied virtually anywhere.

What suggestions would you have to us as members of the committee involved to move in a direction that might improve those shortcomings?

Mr. BAILEY. Unfortunately, Congressman McCandless, my answer requires money, but I think research must be conducted on organic solvents. Solvents right now in our environment are becoming pervasive and they are, in fact, by their nature, able to penetrate what normal pollutants may not penetrate and they move in ways that metals and other inorganics don't move.

So, I think a significant amount of research must go to look at solvents, pervasiveness in the environment, where it is going and the effects it is having.

Mr. MCCANDLESS. Thank you, Mr. Bailey and Mr. Anderson. Thank you, Mr. Chairman.

Mr. BROWN. Senator Presley.

Mr. PRESLEY. Mr. Bailey, I think one of the real immediate concerns of the people in the Glen Avon community is the current status of the situation up there. Can you enlighten us somewhat on that as to whether it is in a containment mode? Is it getting away or do we have anything to be concerned? Are we reasonably safe? Can you help us understand that aspect of it as of this current time?

Mr. BAILEY. Yes. Thank you, Senator Presley. The site itself is secure.

Mr. PRESLEY. You say it is secure?

Mr. BAILEY. Yes; it is. We have finished just recently a minimal erosion control program so that the upper part of the site itself does not further erode and block the drainage channels. The problem that we have is continuing the pumping and hauling of contaminated water from the site so that the waste that is behind the barrier dam—and basically the waste that is behind the barrier dam is there and moving against the barrier dam because of the spring. So, you have fresh water that is soon contaminated. We have to keep that water level low. In addition to that, there is an extractable immediately below the barrier dam that we feel must be pumped to reduce the high concentrations of metals and organics that exist in that area.

The second problem that we have in the fast track that was referred to by Mr. Hedeman is the containment of the contaminated plume. The contaminated plume is not secure. That is our most critical element of addressing that at this particular time.

Mr. PRESLEY. Is that the one that is about 2,000 feet below the site?

Mr. BAILEY. It is approximately 3,000 feet at this time. Yes, sir.

Mr. PRESLEY. That is 3,000 feet below and that is not secure?

Mr. BAILEY. There is nothing to secure it except for two interceptor wells that we know are not sized in a capacity to allow us to keep the material from moving down gradient. The material is moving, as our best estimate, at about 250 to 400 feet per year and I understand it is about 1,000 feet yet from the Pomona Freeway or Highway 60. So, at the worst condition, if we did nothing, the front of the plume would reach that area in about 2 years. Under the best conditions, it would reach that area in about 4 years. What we have to do is contain it and make sure we can manage it so that it does not get into the water supply system and the ground water basin of the Chino area, the Chino Basin.

Mr. PRESLEY. I guess what you are saying is if you are on what is it, the south side of the Freeway or on this side of the Freeway, that is basically safe. There is nothing that has advanced beyond that?

Mr. BAILEY. I am not sure which direction it is, but on the community side of the Freeway, sir, the organic and the metals from the site have not migrated. They are still about 1,000 feet on the site side of the Pomona Freeway up gradient from the——

Mr. PRESLEY. Mr. Chairman, I have one other quick question. Listening to Mr. Hedeman from EPA earlier, he seemed, you know, very concerned about the problem and this is a big problem in California and he said what they are going to be doing. Can you tell us just very briefly how you delineate the duties and responsibilities between EPA and the State, how you are going to interact without duplication and who is going to do what? Could you do that in 10 words or less?

Mr. BAILEY. In the State of California the Department of Health Services is lead agency for Superfund. We expect to remain the State lead agency and we request Federal assistance and their overview in coming to solution to these kinds of problems.

Mr. PRESLEY. So, their involvement will be overview and providing the Federal Superfund moneys and that sort of thing?

Mr. BAILEY. They will help us review the documentation. The decisions will be reviewed by them, but we will make the decisions.

Mr. PRESLEY. You are the lead agency. You are on the spot in California. You are the person that the Governor and the legislature looks to have the responsibility to take care of the problem?

Mr. BAILEY. At the present time, yes, sir.

Mr. PRESLEY. At the present time.

Mr. BAILEY. Yes, sir.

Mr. BROWN. Mr. Clute.

Mr. CLUTE. Thank you, Mr. Chairman.

Mr. Bailey, on your testimony on page 6 you indicated in point No. 2 to suggest to the EPA to delegate decisionmaking to the regional level in order that more timely actions can be taken. I noticed Mr. Anderson also commented about working more on a regional basis with them. Would you comment on how that would help you better to do the job and coordinate with EPA, especially in a situation like this?

Mr. BAILEY. Yes. The regional people have been extremely helpful and supportive. They have supported California all along. They know the problem and they are responsive to our request for assistance and support. By virtue of the fact that they are here—they

are in San Francisco—we can get to them. We can talk to them. We can share the problem with them and make them feel the sense of urgency.

For that reason, we feel that the decisions would best be made in San Francisco. In addition to that, in my opinion, a program of this magnitude cannot possibly be made—excuse me—every decision for all 50 States cannot possibly be made in Washington to the level and degree of sophistication and detail that is now being demanded of the program and still have that program responsive to each of those 50 States. One solution is to let the regional administrator manage their particular areas of Superfund site clean up and emergency response.

Mr. CLUTE. Thank you. I think that is a very key point.

Mr. PRESLEY. Mr. Chairman, may I ask one more question?

Mr. BROWN. Senator Presley.

Mr. PRESLEY. Mr. Anderson, to follow up a little bit on Mr. Bailey's comment that he thinks for the most part that everything south of the freeway is relatively secure, what is your assessment of the water supply of everything on this side of the freeway in this community?

Mr. ANDERSON. From our previous sampling, our assessment is that the water supply—and these are mainly private wells—is safe, although they are high in nitrates, which creates some other public health concerns, but not a specific contaminant from the site. So, our assessment agrees with Mr. Bailey. The only place I would disagree with him is although the three interceptor wells may not be sized to totally remove the waste plume that has already come down the hill, we would like to see those wells pumped because they are effective in moving water up hill. We have demonstrated that and we would like to see them pumped. It is a very expensive process, however, and I understand that that is a concern, but that plume does react to those interceptor wells.

Mr. PRESLEY. But other than nitrates, you think the water in this community is safe? And nitrates are not—that is not connected with the site. That is another chemical in the water. That can be in the water in a lot of places, I guess. That can be in water in many places, I guess, nitrates.

Mr. ANDERSON. That is right.

Mr. PRESLEY. Thank you.

Mr. BROWN. Mr. Hayden.

Mr. HAYDEN. This is a question really for the both of you. I certainly don't envy you your jobs. You have gotten involved in one domain and suddenly its become a national issue and there is a whole range of new dimensions to your jobs. You have heard testimony today from people in this room who apparently represent large numbers in the community who say that they feel alienated or at a distance or manipulated by or ignored by either or both of you. [Applause.]

I didn't say that to encourage applause. I said that to try to focus what you are going to do about that. How do you deal with feeling that you do not have the support of the immediate people affected and specifically on this water issue that Senator Presley has raised? I guess now, Mr. Bailey, you are in charge of the site, the Department of Health Services, and there have been allegations

that for one reason or another information was not given to the community about the potential of carcinogenic materials in the water. How will an average citizen after this hearing on a day-to-day basis find out the state of the water? Who do they turn to, Mr. Bailey? How would you propose to satisfy community concern there?

Mr. BAILEY. Thank you, Assemblyman Hayden. I want to make one comment first and that is that the local health advisory committee, which I believe Mrs. Newman referred to in her comments, met at the request of the Department of Health Services to share data that was recently collected at the request of the Department of Health Services. The presence of the solvents, the organics, at this site have been known for some time. The Department of Health Services did not make any pronouncements recently, but under Superfund we started a comprehensive sampling program. The site was turned over to us literally and the keys were handed to me—more or less figuratively, but almost literally—in November 1982. We have started a comprehensive monitoring program, which I believe began in late January or early February. That program will continue.

Now, the answer to your question is I intend to abide by my commitment to have an active public participation program and we will share with the community all of the data that we get that is quality assured. And I say that because there is a problem of quality assurance in solvents. We cannot get laboratories many times to agree on what the analytical result was and I am not going to release data that I am not confident represents the real situation. So, we will probably be criticized for holding back data. I will accept that criticism. I am not going to be irresponsible to try to react to public pressure, but we are going to share all of the data. That is the answer.

Mr. HAYDEN. If I understand you, you are going to share all of the data that you feel passes a quality control test.

Mr. BAILEY. An analytical quality control test to confirm that the data and that numerical number is representative of what is really out there in the environment.

Mr. HAYDEN. A lot of people say that if there is a significant question about what is in the water, you ought to take the most prudent course, and since these things are not going to be proved in our lifetime necessarily, the public has a right to know if questions have been raised. So, you are saying you are not going to share what kind of data? What if the data is of a nature that is not conclusive, but points to a very, very serious threat? Are you saying you would not share that with the public if you felt it wasn't conclusively proved?

Mr. BAILEY. What we will share with the public, Assemblyman Hayden, is the extreme difficulty of conducting the analytical analysis and when we have two certified laboratories that give me two different results, I am not going to accept either. I am going to go out and get more samples and have that data verified so that I can find out, in fact, what is in the environment. All of that is going to be shared with the public.

Mr. BROWN. Do you have anything further, Mr. Hayden?

Mr. HAYDEN. I was just wondering if Mr. Anderson——

Mr. ANDERSON. I agree with Mr. Bailey and in addition I look back at some old data. We did a screening for organics in 1979 and the lab results showed most of them nonexistent. I believe those lab results were probably erroneous. We shared those with the community and were misguided in that the toxics or the solvents were, in fact, there. But, irregardless of solvents, the water is polluted and what we had done during our construction program to inform the community was monthly send them a bulletin of the monthly progress, including the warts, on that project, the things that needed to be done, the corrections that needed to be made, the change orders that needed to be instituted. They were informed during that program that we had an ongoing ground water management problem; namely, the ground water plume that had escaped from the site during its operation and due to the overflow in 1978.

The community was informed. Whether they perceived that that meant carcinogens, I doubt, but it was polluted water and the regional board wanted that polluted water out of the ground and through a class I site. Whether it contained solvents or heavy metals or just a load of sulfate, it had to be removed and that was the plan all along for the abatement program at the site.

Mr. BROWN. Mr. Bailey, I have felt for some time that there was an inadequate program of epidemiological investigation on this site and it is not characteristic just of this site. We are weak in epidemiology all across the country in any sites. I would like to have you tell me what you are currently doing to remedy this weakness and whether you think it will give you the information you need to measure the cost of allowing this site to continue here. I am talking in terms of the health costs to the population.

Mr. BAILEY. Mr. Chairman, the immediate answer is that the information that was, in fact, only given to me last night and then I heard it again today in testimony, that there may be a problem with the way the epidemiology health effect survey was designed. That is new information. So, on that basis I am going to go back and ask our acting deputy director to request that this entire issue be reviewed for this site.

In the longer term, we are already establishing a process to have the epidemiology section work with my section for health effects surveys in general at all sites where there is a potential health effect and we are going to work on those in accordance with the priorities that are established for our hazardous waste Superfund site list, just as we do for remedial action clean ups.

I don't have an answer for you in terms of what we are going to do to rectify the deficiencies in epidemiological surveys as such because I am a sanitary engineer. I am not a health official. I am not a physician. I am going to have to depend on the physicians to give me guidance in terms of what has to be done in epidemiological studies.

Mr. BROWN. Do you rely on the county health staff to develop the epidemiological data that you use or would plan to use in connection with a study of this sort.

Mr. BAILEY. The present study was funded by the State under the direction of the physicians that we have on our staff in Sacramento at the department of health services. The contract was with

the county and subsequently with the University of California at Los Angeles. We are using the professional epidemiologists on the University of California staff to actually conduct and evaluate the results.

The survey itself, I understand, will be conducted with local personnel, but the results, the formating of the study was done by professionals at UCLA and on our staff.

Mr. BROWN. I am going to continue to follow this particular aspect. I am not threatening you or anything, but I have been concerned for the last 10 or 12 years about the national adequacy of our epidemiology. I think this is a clear-cut example of where we could benefit from improving this capability and it would be of tremendous value to the community and to our national capability. I am going to see if we can't use this as an example of how we can do an effective epidemiological study in a reasonably short period of time, although I know that you are talking about carcinogens that may take years to get the data you need. But this is a situation where we should have been compiling this data over a long period of time and if we haven't, we should start now. [Applause.]

Any further questions of this panel of witnesses? If not, we thank you very much. You have done very well, gentlemen.

Our last panel this afternoon were chosen to provide expert testimony on some of the technical problems of managing a major toxic dump of this sort. It includes Dr. Joel Hirschhorn, who directed a project on strategies for hazardous waste control for the U.S. Congress through the Office of Technology Assessment; Dr. Donald Stierman, who is a professor of earth sciences at UCR and will speak on the geology of the site; Mr. Kenneth Kazarian, vice president of BKK Corp., which operates the only other major or the only major site, I guess, in this area that handles toxic waste substances, and Dr. Donald Whorton, associate professor of the School of Public Health at Berkeley.

I have asked each of you gentlemen to make a reasonably brief statement. We will put the full text of your statement in the record, of course, and leave a little time for us to question you about some of these important matters that you will be discussing.

You can proceed in the order that I called your name. Dr. Hirschhorn, do you want to go first?

STATEMENT OF DR. JOEL HIRSCHHORN, PROJECT DIRECTOR, TECHNOLOGIES AND MANAGEMENT STRATEGIES FOR HAZARDOUS WASTE CONTROL, OFFICE OF TECHNOLOGY ASSESSMENT, CONGRESS OF THE UNITED STATES, WASHINGTON, DC

Dr. HIRSCHHORN. Thank you, Mr. Chairman.

We recently released a 400-page document as a result of our 3-year study on hazardous waste and, obviously, I will just try to touch upon a few points of the results of that study that relate directly to the Stringfellow site situation here.

First, I would like to note that generally the study found that the magnitude, the scope, of the hazardous waste problem facing the Nation is far worse than most people generally recognize; second, that the actions taken to date to deal with that national problem are far less effective than most people generally recognize and,

third, that there are a number of opportunities for Congress to deal with the problem.

As far as the Stringfellow site is concerned, I would note that I find the Stringfellow site just a good illustration of a much larger national problem. And the first point I would like to make is that of the economics involved here. The cost to clean up uncontrolled sites, such as Stringfellow, generally will be 10 to 100 times greater than it would have cost originally to permanently treat or destroy the hazardous waste in question. I think it would have cost possibly about $6 million originally to treat the hazardous waste put into the Stringfellow site and I think it will probably end up costing $60 million or more to deal with this situation. When I say "deal with it," I mean deal with it in a very complete and permanent way, so that the uncontrolled site problem facing the Nation will require very large sums of money. We estimate conservatively, I think, $10 to $40 billion to deal with the presently known sites and there are 15,000 presently known uncontrolled sites and from our study, more sites are being discovered every day.

The second point I would like to make, and this really relates to things other witnesses have said today, is that the technical base of knowledge and experience for cleaning up uncontrolled sites is extremely immature, that there are remarkable problems and what we generally see is a sort of Band-Aid approach to cleaning up sites and I think the Stringfellow case study really demonstrates that, that the first reaction that continues too long is to try and contain the waste in some way, rather than deal with the source of the problem, rather than to deal with more permanent solutions.

In this regard I would note that under the Superfund statute, EPA had to design what is called the national contingency plan. It is under the national contingency plan that alternative clean up technologies are supposed to be evaluated and a cost effective solution obtained.

Here, I want to emphasize that the way EPA has implemented and designed the national contingency plan does not assure, so to speak, that the best technologies, the best technological solutions are even being considered when alternatives are being evaluated with regard to their cost effectiveness.

For example, there is no set of national standards to determine the extent of clean up in the national contingency plan. This is often referred to as the "How Clean is Clean" question. The problem that you see at Stringfellow even today is how do you know how far you have to go to clean up the site, without standards telling you how far you have to go.

What we are saying is that the current national contingency plan does not force technology. It does not promote the use of the best technology or the highest technology to deal with clean ups.

I would note here that I found this part of Mr. Hedeman's statement rather remarkable. For the first time he has admitted that EPA does not have an adequate set of guidelines or procedure to even evaluate alternative clean up technologies. We have been saying this all along. I think it is a remarkable admission. It makes one wonder how they are deciding and how they have already decided on what the appropriate clean up technology should be.

So, I think that my big point here, that containment approaches, such as clay caps, are not the permanent answer. There are permanent answers. They will cost more money, but what we have seen is generally that the permanent solution to the problem has not generally been included in the evaluation.

The third point I want to make, and this, again, reinforces what other people were saying, is that we discovered that there are extensive problems between the Federal program and the States. One of the things that I would emphasize is that EPA has tended to shift the decision on the selection of clean up technology to minimize the initial cost, to minimize the spending of the Superfund and to shift costs to the States. It is very important to recognize that it is the State that has 100 percent responsibility for all future operating and maintenance costs after initial action is taken at a cleanup site. So, there has been a tendency on the part of the Federal EPA to minimize initial costs at the expense of the States and long-term costs.

What this means is that you tend to be biased in this strategy to picking out low initial cost containment approaches, such as clay caps and things like that, rather than picking out the really high initial cost permanent solutions.

As far as the broader picture is concerned, we really have looked a great deal at trying to prevent future Superfund sites, uncontrolled sites, things like Stringfellow, from being created. I want to emphasize here that most of the hazardous wastes being produced in the Nation are still going into the environment. Waste is still going into the land and I find it interesting to note that the waste from Stringfellow has been taken from the Stringfellow site and put into another location. What the OTA study concluded was that the current regulations, the Federal EPA regulations, which dictate the quality of land disposal for hazardous wastes in this country, that these regulations are inadequate and ineffective, which makes one conclude that we have just shifted hazardous wastes from one location to another location. And then at that second new location, we still will not be assured of any protection in the long run.

I think this is an extremely important point if we are ever to get ahead of this uncontrolled site problem.

The other point I want to make is that although land disposal is not adequately regulated today and it is used so much, it is not necessary to use land disposal. Our study and another study by the National Academy of Sciences concluded that for every hazardous waste produced in the nation there is a technical solution, a way either of not generating the waste in the first place or a way of permanently treating, destroying or detoxifying the waste. You do not have to use land disposal. [Applause.]

The obvious question is, if you don't have to use land disposal, technologically speaking, and so many people continue to use land disposal, why is this the case? We asked ourselves that question. Why aren't the alternatives to land disposal being used by industry that generates all this hazardous waste? And the answer is economics. The reason why people continue to use land disposal is because the market prices are low, but the reason why the market prices are low is that they are artificially low, is that the Federal

regulations which govern land disposal do not lead to the full cost of land disposal being incurred by the people who use land disposal. [Applause.]

What I am saying is that some of the costs of land disposal today are being shifted to society as a whole and the Government and to future generations. If you don't want people to use land disposal, you have a few choices. You can make your regulations tougher and the OTA study certainly recommends that that be done and suggests all kinds of ways to strengthen the regulations, but that is going to be a long difficult process.

We have another proposal, which is perhaps an economic and a quick fix to the problem and relates to the nature of Superfund. And that is the financing mechanism to Superfund. Superfund right now is being financed by a tax on feed stocks of chemical and petroleum chemicals, things that go into manufacturing. What we propose is that Superfund be financed by a tax on all hazardous waste generators in the Nation, a tax that is so structured so that it is biased against all forms of land disposal, that is to correct the economic situation, to make land disposal more expensive so people won't use it, so that alternatives to land disposal will be used.

This proposal, this way of funding Superfund, would allow much more money to be generated, and I would emphasize that, from the data that we have seen, far more money is required to use permanent solutions to clean up sites than the $1.6 billion currently in the Superfund program. So, by putting a tax on hazardous waste generators, you can do two things. You can generate more funds and you can do it in an equitable way and in a way which influences current management decisions.

If people have to pay more for land disposal, they simply will not use it. If you make treatment alternatives competitive with land disposal, they will be used and you will stop producing uncontrolled sites for the future. This is the only way to get ahead of the situation.

We have also in our proposal, and very apropos to this committee, suggested that some of the funds from the collection on a waste-based fee system be used directly to support State programs. The States need more financial support. The States need more technical support and a way to do this is to take a certain percent of the money directly from the funds generated through a tax on waste and provide assistance for State programs. Another thing that would go along with a waste-based fee system would be assistance for R&D. There may be R&D problems in the private sector, site-specific, waste-specific, product-specific problems. Companies will need R&D assistance. They may also need capital assistance. There are ways of providing assistance without budgeted outlays of funds.

So, what we have proposed is a comprehensive approach to deal with the problem—better regulations for land disposal; a way of funding the Superfund that affects current decisions. I want to emphasize that it is the hazardous waste generator that is the key decision point in the whole process. It is the generator that must decide whether or not to investigate ways to produce less waste. It is the generator that must decide whether or not to use inciner-

ation which is costly versus artificially low priced land disposal. It is that decision point which must be affected in the whole system.

We belive that if this is done, this will provide a relatively quick solution to the problem. When I say "quick," we are still looking at decades of very costly remedial actions at uncontrolled sites. Again, I want to emphasize that we probably need a lot more money to deal with the Superfund uncontrolled site problem than we generally recognize today.

Thank you.

[The prepared statement of Dr. Hirschhorn follows:]

STATEMENT OF JOEL S. HIRSCHHORN

PROJECT DIRECTOR, OFFICE OF TECHNOLOGY ASSESSMENT

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

COMMITTEE ON SCIENCE AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

April 22, 1983

Mr. Chairman and committee members, my statement responds to your request for a summary of those results of the recently completed OTA study TECHNOLOGIES AND MANAGEMENT STRATEGIES FOR HAZARDOUS WASTE CONTROL which deal with the use of technological alternatives to land disposal of hazardous wastes. A primary reason for minimizing use of land disposal for hazardous waste is to stop creating more uncontrolled hazardous waste sites in the future which require Superfund attention. The focus of today's hearing is on the Stringfellow Acid Pits as a case study of the performance of the Superfund program. It is possible to make several observations about the Stringfellow experience and our findings on the technical aspects of the Superfund program. I will do this first, and then discuss alternatives to land disposal and our proposal on how to modify the Superfund legislation so as to promote the greater use of these alternatives as well as to provide adequate funding for cleanup actions.

THE STRINGFELLOW EXPERIENCE AND OTA'S FINDINGS ON THE SUPERFUND PROGRAM

Although cleanup experience has been limited, it is clear that there is

an economic necessity to prevent the need for cleanups by more effective management of hazardous wastes. Extensive CERCLA funded cleanups generally will cost 10 to 100 times as much as it would have cost initially to manage the wastes so as to avoid future cleanups. Proper treatment rather than land disposal of the 32 million gallons of waste deposited at Stringfellow during 1956 to 1972 would have cost perhaps $6 million compared to current estimates of as high as $60 million to clean up the site.

Stringfellow typifies the national situation. The cost to the nation of cleaning up the currently known 15,000 uncontrolled waste sites is likely to be at least $10 to $40 billion. If only one-one hundredth of one percent (0.01%) of the hazardous waste disposed of in the nation's land since World War II (probably about 20 million metric tons average per year, or about one trillion pounds) were highly toxic, then 100 million pounds of highly toxic compounds threaten our health and environment. In comparison, only about 50 pounds of dioxin in contaminated oil was spread in Missouri. More sites are still being revealed, and present policies and regulations almost assure more uncontrolled sites for the future.

Second, the technical base of knowledge and experience for cleaning up hazardous waste sites is still immature. The difficulties of determining and implementing remedial cleanup techniques at Stringfellow during the past ten years since leaks were first discovered are representative of the national condition. All too often there is a "band-aid" approach which consists of attempts to stop leaks and releases of hazardous materials into the environment, while the long-term problem remains unsolved. The current National Contingency Plan provides no specific standards for determining the extent of cleanup. This makes it difficult to estimate total cleanup costs, and can also lead to selection of cleanup techniques that may prove to

ineffective over time. Most importantly, there continues to be - as there has been at Stringfellow - a reliance on containment solutions rather than permanent destruction and treatment of waste and contaminated materials. Containment of waste, however, provides little engineering assurance of long-term effectiveness. The current Superfund program can be improved by instituting cleanup standards and by providing incentives for cost-effective yet permanent solutions. There is also a need for R&D on techniques for onsite cleanup of large masses of wastes and contaminated soil.

Third, our report provides extensive discussions of the problems faced by States under Superfund. EPA has tended to shift costs to States by favoring cleanup techniques with long-term operating and maintenance costs all of which States must pay. In addition to the well known administrative delays and uncertainties at EPA, there has been insufficient technical support from EPA and no funding assistance for necessary ongoing State Superfund activities unrelated to specific site cleanups.

THE NEED AND MEANS TO STIMULATE GREATER USE OF ALTERNATIVES TO LAND DISPOSAL

First, a general finding of the OTA work is that land disposal, which is used for as much as 80 percent of hazardous wastes, cannot even under the new EPA land disposal regulations assure adequate protection of public health and environment, either in the near-term or decades from now. Moreover, since our report was released, EPA has revealed that 64 percent of hazardous waste management facilities required to implement ground water monitoring were not in total compliance. Even the current regulations contribute to the incomplete internalization of the full, long-term costs of land disposal and,

therefore, help keep land disposal costs artifically low in comparison to the costs of alternatives. Our report provides details on how current land disposal regulations shift costs from industry to government and society as a whole.

Second, for those wastes for which land disposal is clearly inappropriate, such as highly toxic wastes that are persistant, mobile, and bioaccumulative, there are technically feasible alternatives that could be used to reduce the volume of wastes generated or to treat wastes so as to permanently remove hazards. Our report provides detailed discussions of these alternatives, including some problems with implementing them, such as controlling emissions of toxics from incinerators, and the limitations of recycling and other waste reduction efforts.

It is important to stress that land disposal is appropriate for some hazardous wastes, particularly pre-treated waste, treatment residuals, and non-toxic wastes, especially low hazard-high volume wastes. Although here too there may be wastes that would pose unacceptable risks by being land disposed. However, nationwide many wastes that should not be land disposed continue to be placed into our environment. Why then are alternatives to land disposal not being used to a greater extent?

The chief answer is that there is currently insufficient economic motivation to use alternatives to land disposal. As a complement to the regulatory approach, which can have some limited effects on raising the costs of land disposal, the OTA study proposes the introduction of direct economic incentives for the greater use of alternatives to land disposal. When the problem of compensating for artificially low land disposal costs is corrected, it is likely that the private sector will also deal more effectively with associated issues such as the need in some areas for regional facilities,

special arrangements for small waste generators, and problems with siting treatment facilities.

We have examined the feasibility of using a Federal fee system on hazardous waste generators; such a fee system would also provide a means to influence current management decisions. Several levels of fees can provide direct incentives to reduce waste volumes and to treat wastes as an alternative to placing still more hazardous waste into the environment. Changing the basis of funding for CERCLA from fees based on feedstocks to fees based on wastes should be viewed as an evolutionary improvement made feasible by the progress achieved under RCRA and CERCLA to date, and made necessary by the increasing awareness of the limitations of the regulatory approach.

The goal is to integrate CERCLA and RCRA so that the land disposal of newly generated wastes will not create still more uncontrolled sites in the future.

The following is a brief summary of the waste generator fee option (policy option III in the report), preceded by a brief discussion of some objections to such a system.

POSSIBLE OBJECTIONS:

1. Is it feasible to implement such a Federal fee system?: It would have been difficult to implement this approach in 1980 when CERCLA was initiated because of the lack of information on waste generators and wastes. Fortunately, in response to various requirements under RCRA and because of many State initiatives, there now exists the improved data base necessary to implement such a system. And with some time provided before implementation, of such a system, there will be ample time and motivation to further improve the data base. Moreover, it is possible to take readily available information

on industrial activities and determine what hazardous wastes and quantities are likely in some defined geographical area. Both the results of OTA's survey of the States and EPA data indicate a total of about 60,000 hazardous waste generators nationwide. Even a doubling or more of this figure by ending many of the exemptions under RCRA, would not overwhelm a national reporting and fee collection process. Such a base of funding is far more equitable than the approximately 500 parties now paying the feedstock tax, with probably less than 100 companies paying the bulk of the burden.

2. Are there critical capital and R&D needs?: Some waste generators and commercial waste managers may need capital for waste reduction or treatment equipment at existing facilities or to build new waste management facilities; they may also encounter technical problems requiring R&D. The solution for both is to tie the Federal fee system to Federal assistance for those capital and R&D needs that are directly related to desired changes in hazardous waste management practices. Assistance can be provided in ways that do not necessitate direct Federal outlays, such as by loan guarantees. A portion of the Federal fees collected could be used to support these assistance programs.

3. Will fees distort the marketplace?: Fees on wastes would correct a current market distortion wherein parties not directly receiving the benefits of the products or services that lead to waste generation, and release of hazardous constituents into the environment, have to pay for necessary cleanup actions. The purpose of the fees (particularly on land disposal) is to internalize the full costs of long-term management of hazardous wastes so that both waste generators and consumers of "hazardous waste-intensive products" pay, rather than shifting costs to the government or society as a whole. Fees on generated wastes would be spread equitably throughout society in direct proportion to the corporate and personal responsibility for

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contributing to the problems of hazardous wastes. In this regard, the results of a major poll taken this month and released this week are significant. The New York Times/CBS News poll asked if people favored improvements in environmental protection "regardless of cost." The percentage answering in the affirmative increased markedly across all categories of the public as compared to already high values in September, 1981. Today 58 percent agree with the need to spend more for this purpose, compared to 45 percent previously. Increases in consumer prices, therefore, resulting from fees on hazardous wastes to finance the Superfund program are not likely to be resisted.

4. Will fees place too heavy a burden on industry?: Many fees will represent a small fraction of current waste management costs, probably from 5 to 20% for many cases. But in other cases, costs may increase from 50 to 100 percent. Naturally, fees must be great enough to affect waste management decisions. Adverse effects on generators can be minimized by (1) providing sufficient time before implementation to allow planning and changes, and (2) providing Federal assistance for capital and R&D needs. If current gaps in RCRA regulatory coverage are closed, more wastes will be regulated. Income from fees could in principle allow the general level of fees to be reduced. And as less waste is produced, less funds are needed for government regulatory programs.

OBJECTIVES OF A FEDERAL WASTE GENERATOR FEE SYSTEM:

- To shift the balance from disposal of hazardous wastes in the land to the reduction of waste generation at the source and to treatments that permanently destroy or detoxify wastes.
- To better prevent the formation of new uncontrolled waste sites that

endanger the public and require massive spending for cleanups.

CHARACTERISTICS OF A FEDERAL WASTE FEE SYSTEM TO ACHIEVE GREATER USE OF ALTERNATIVES TO LAND DISPOSAL AND TO REFLECT REAL COSTS MORE ACCURATELY:

1. Fees should be much higher for the most hazardous wastes that are land disposed.

2. Fees should be lower for wastes that are chemically, thermally, biologically,or physically treated instead of or prior to land disposal.

3. Fees should be lower for high volume-low hazard wastes (i.e., not hazardous because of toxic properties).

4. There should be no fees for wastes that are recovered or recycled onsite for their energy or material value.

5. The fee structure should be simple, using several generic categories of wastes and fee levels. (Note that administration of a fee system is far easier than administering a technically complex regulatory system.)

6. There may be higher fees on wastes managed offsite because of the greater potential for CERCLA actions resulting from transportation accidents and spills.

7. There may be higher fees on wastes disposed of in land disposal facilities regulated less stringently than new ones because they are "existing portions" of operating facilities as defined in RCRA regulations.

RELATIONSHIP TO CURRENT RCRA AND CERCLA PROGRAMS:

A Federal program of economic incentives would constitute a "market" approach to complement the "command and control" regulatory approach under RCRA. It provides another means to achieve the same fundamental goal - protection of public health and the environment - but the "market" approach

compensates for inadequacies in the technical basis of RCRA regulations and standards, and in the administration and enforcement of them by EPA. While RCRA and CERCLA may have some indirect incentives for improving management practices, their effects are both slow and uncertain.

The proposed Federal fee system would replace the current CERCLA funding mechanism based on fees on chemical and petroleum feedstocks; these have little relationship to amounts or types of hazardous waste generated or to the quality of their management. Changing to CERCLA fees on wastes would provide a direct and more equitable means to influence current RCRA management practices. A Federal waste generator fee system would help to integrate CERCLA and RCRA into one coordinated Federal program.

RELATIONSHIP TO STATE ACTIVITIES:

Several States have already instituted fees on waste generators. There are good examples of simple fee structures, particularly from Minnesota, New York, and California, and these are described and discussed in our report. It is our understanding that the California system has already resulted in substantial reductions in hazardous waste generation, and that no major problems have been encountered in administering the fee system.

The major issue is that while some States may use waste generator fees, many others will not or cannot. A uniform, national fee system provides equitable uniformity and is needed to prevent the formation of "pollution havens." Moreover, State fees often produce minimal revenues, and sometimes are not used to fund hazardous waste activities.

States' support for the Federal fee system could be achieved by providing the States a portion of the funds collected so that State hazardous waste programs have both adequate and assured funding. (This could replace current

but uncertain RCRA grants to the States and an absence of Federal funding for many CERCLA activities.)

USE OF FUNDS:

The funds collected could be used for: (1) supporting expanded CERCLA activities, (2) supporting State programs, and (3) providing Federal assistance for capital and R&D efforts required by industry to reduce waste generation or use treatment alternatives to land disposal (this is an integral part of our policy option). OTA believes that it is possible to raise the necessary funds for these three uses (from $1 to $2 billion annually) without causing major economic hardships on either industry or consumers.

EPA'S AND INDUSTRY'S POSITIONS:

On the record, there is evidence that EPA supports the concept of CERCLA fees on wastes rather than feedstocks, supports the concept of raising revenues for State programs by using fees on waste generators, and supports "market" approaches to achieving regulatory goals of environmental protection. But they have made no clear statement on a Federal waste generator fee system.

The Chemical Manufacturers Association has testified in support of a Federal waste generator fee system for CERCLA. It is also our understanding that other trade associations and various companies are also likely to favor this approach. However, it is clear that many companies not now assessed under CERCLA would face new payments under this proposal.

Mr. BROWN. Your statement is so popular with the panel that they would like to ask a few questions, Dr. Hirschhorn.

Before I recognize Ms. Tanner, I would like to point out that the summary of your 400-page report is available from the Office of Technology Assessment. For any of the people of the community who would like to have a copy, we might arrange to provide one for them, if they would request it.

Ms. Tanner.

Ms. TANNER. Yes; Doctor, the state Superfund, of course, does tax the generator, the waste generator. That is the form of tax that we use for our Superfund. Do you have any data at all to show that it does reduce the amount of waste disposed of?

Dr. HIRSCHHORN. We have used the California system as an illustration in our study of several State systems, which have applied this concept of a tax on generators. We have been informed in recent weeks that the California system of tax on generators has already led to a reduction in the generation of hazardous waste by perhaps as much as one-third in about the last year.

The economic influence, again, is very, very important to understand here. Most people are making decisions today in industry on the basis of economics and the data that we have, by the way, is also that the tax in California has been administered without any major problems. So, we think this is a feasible approach.

I might note that other States who have attempted to do this, unlike California, have generally too low a fee or tax on the waste; that is, their rates are too low to influence current decisions.

Ms. TANNER. Of course, that is the reason we designed the bill in that way so that the tax would encourage the generators to reduce the amount of waste. But, of course, we are still generating tremendous amounts of waste and until we have enough technology and ability to treat that waste, unless we have a secure—so-called secure—landfill, and I hope we have some secure landfills, if we don't use those, then I am afraid that we will have even more illegal dumping. So, until we have enough technology developed for treatment—you know, it really concerns me that we consider closing down all of the existing landfills and I wouldn't even want to consider that until we have something to replace those landfills.

Dr. HIRSCHHORN. I agree, and my point is that there is a lot of private money out there, capital, that would be invested in treatment facilities if they had a perception that Government policies were not against them, that the market situation was fair and equitable. I think the taxing and fee approach begins to assure people in the private sector that their facilities would be used if they were built.

Ms. TANNER. Thank you.

Mr. MCCANDLESS. Mr. Chairman, I am going to reserve my questions for a later time in a different location and give the time to the other members of the panel and the other people who are going to speak. I know where to get Mr. Hirschhorn whenever I need him.

Mr. BROWN. Senator Presley.

Mr. PRESLEY. Since you are here and on the subject, I think it may be a good time to ask it. Your statement I found encouraging in that you are saying that the technology is available to treat and

destroy hazardous wastes currently and the reason that it isn't being done is a matter of economics and the question is economics of who. You know, it is economics in the scenario of the producer versus throwing it over on the taxpayer.

But is your view—if this is a fair question—is your view accepted by the scientific community in general that we do have this technological capability at the moment?

Dr. HIRSCHHORN. It was very interesting that the day we released our study the National Academy of Sciences had been conducting its study on technological alternatives of land disposal and they released their study the same day and they said exactly the same thing. It was a different group of people conducting that study. We have dealt a great deal with people in the waste management industry. We discovered something several years ago. We didn't quite believe it, but we kept looking at the situation and we came to the same conclusion. The issue is not whether or not you have technology. You do have technically proven technologies. Oh, you can always improve them and refine them and increase the number of them and that should be going on. But really I would say that the key is economics at this point.

Mr. PRESLEY. But that technology is not applicable to cleaning up an existing site, I guess——

Dr. HIRSCHHORN. That is not quite true either. There are technological solutions to onsite treatment and decontamination of soil and leachate. They will be more costly—and again, I want to emphasize that EPA policies in generally have not focused on using those what appear to be more costly solutions initially. And I would say they appear to be more costly, but in the long run they may be, in fact, the most cost effective.

The idea behind the cost-effective strategy is to maintain the public policy goal of protection of human health and the environment and then to pick the least-cost alternative to get to that level of protection. I just feel, and I think Stringfellow illustrates, that the Band-Aid approach, clay caps and things like that, really do not keep that level of protection as a constant. They tend to use what appear to be low-cost alternatives, but they are only low cost in the short run. In the long term, constantly fixing up the clay caps, trying to deal with a contaminated aquifir, will be far more costly.

Mr. PRESLEY. Thank you very much.

Mr. BROWN. Unless the other members have urgent questions, I would like to proceed with the other witnesses.

Dr. Stierman, would you proceed?

Dr. STIERMAN. Thank you, Mr. Chairman. Initially, I intended to show a series of slides, but in the interest of time and because the conditions are not optimum, some of the slides are sort of vague, I will skip that. I will provide copies of these pictures in the final version of my prepared statement.

Mr. BROWN. Can you give me a private showing later?

Dr. STIERMAN. Oh, certainly.

It was interesting to hear both Mr. Hedeman and Mr. Bailey testify that more information regarding the geologic framework of the Stringfellow site is needed before we can design an effective cleanup program. Over 4 years ago I submitted letters expressing exact-

ly that opinion through Senator Presley's office and my proposals to conduct these needed preliminary studies were rejected as unnecessary or unaffordable by State agencies.

The agricultural experiment station of the University of California at Riverside has provided me with approximately $6,000 plus research assistance for the past 3 years to conduct some studies at the Stringfellow site. Understanding of and appreciation for the geologic framework are essential to the safe operation of landfills containing hazardous substances. The fact that the Stringfellow disposal site did not perform in an acceptable manner was due for the most part to geologic and hydrologic factors, which were overlooked or poorly understood or ignored.

Efficient cleanup strategy for those hazardous waste sites which require remedial action will likewise be based on a thorough comprehension of and respect for relevant geologic elements.

I will skip the history of the site because that is in my prepared testimony and we have probably heard it too many times before. But the oversights that were made in the initial studies at the site had serious consequences because subsequent engineering decisions were often predicated on the accuracy of authoritative assertions regarding the integrity of the rocks of Pyrite Canyon and on the assumption that geologic conditions there were sufficiently well understood.

These assumptions resulted in numerous instances where engineers were surprised by conditions encountered underground and these surprises often resulted in unanticipated delays and expense and often mandated stopgap measures.

The fractures under the site typically in the granite are on about 1 foot centers, as I have observed them in trenches and cross-sections and we do have a slide showing that. Although these fractures tend to decrease with depth, exploratory drilling conducted by Woodward-Clyde encountered some fractures as deep as 200 feet under the site in the granitic rocks.

I have studied these fractures and attempted to extract pollutants from the site to test how deeply the contamination has gone and in your prepared statement you will find my figure 1 has a graph showing the amount of chromium, which we think is an appropriate marker for this site, as it is distributed under the site.

My interpretation of the pattern in this graph is that the upper 75 feet has been invaded by relatively undiluted pure essence of waste materials from the site, that at about 75 or 85 feet the natural ground water in the site occurred and that from there on down the substance was being diluted and I find evidence for contamination as deep as 150 feet. Below that depth we are so close to background, that is what we find in normal rocks, we really can't say whether or not it goes any more deeply.

In my second figure I have a cross-section that I have reconstructed—actually, one of my students reconstructed—based on the drillers' logs provided by Woodward-Clyde. The numbers on the figure show in parts per million the amount of chromium extracted on four of the bore holes. We see here that we have high contamination in at least three of those bore holes. So, we are not looking at contamination in a single fracture but at a very pervasive inva-

sion of the granitic rocks down to, perhaps, 150 feet underneath the site.

Now downstream from the site, the ground water plume is moving toward the south, as our previous witnesses have said. There is evidence, and we have heard it today, also, that this pollution does extend beyond the previously installed interceptor wells. Now, as part of our research, we have been using geophysical means of mapping the contamination in the subsurface and we have demonstrated that this electrical resistivity can be used to map the location of contaminated water in the alluvium and Pyrite Canyon. We have not had the resources to conduct a complete mapping program and there are some problems in using geophysics. It doesn't always work. That is why we have to have people who know what they are doing conduct these types of studies.

We would be willing to complete this type of study if we can find the funds to do it.

The exploration for the pattern of contamination in the granitic rock is a much more difficult problem because the electrical signal is so strong in the alluvium we can't really see through the alluvium geophysically. So, in order to reach and explore the granitic rocks, we are going to have to drill or someone will have to drill a series of shrewdly placed exploratory wells to locate and characterize off-site migration of the pollution in the fractured granite.

Now, how we can deal with the contaminated water in the fractured granite is an entirely different question altogether. In my opinion grouting is not 100 percent effective in blocking the flow of fluids through fractured rocks and there is no guarantee that any grouting program will intercept every fracture, that grout will hold up in perpetuity or that new fractures may not open in the ground. No one knows what forms the deep fractures in Pyrite Canyon. It is not the type of fracturing one sees in fall zones and it is not exactly jointing. I don't know what the origin of these fractures are, how old they are or other details on how they form.

In addition, isolating contaminated material onsite would require perpetual vigilance and, of course, excavation of the entire volume of contaminated rock is out of the question. Even if money were no object, such a massive mining operation would leave a hazardous open pit and we see what the open pits are like over in the Crestmore Quarry area. I don't believe that is an acceptable alternative.

Now, there is an alternative available for handling the contaminated fluids in the fractures. This would be by methods currently employed by oil and gas industries to enhance production in low-permeability rock. We believe that hydraulic fracturing of the granite would enhance the recovery of fluids from this granite, allowing it to drain the fluids to wells in the granite and ultimately pump them out of the site. Of course, preliminary studies would be needed to design such a project, but there are engineers available who have experience in doing this in oil fields.

In summary, I would like to say that some facts relevant to selecting an ultimate strategy in Pyrite Canyon remain poorly determined. These include the spatial distribution of contamination in the alluvium, the distribution of contamination in the granitic rocks and the speed at which the contaminated stream is moving through these materials.

We can use geophysical methods to monitor these numbers in the alluvium. We are still not sure about the granite. We think that artificial drains generated by hydraulic fracturing should be examined as a method for extracting contamination from the granitic rocks underneath and downstream of the site.

I would like to close by saying that putting grout curtains across the front of the site is very similar to closing a gate after a flock of sheep is halfway through. Most of the material that was going through these fractures was continuing in granite downstream from the site. So, the current site of the grout curtain is not at the front of the pollution in the granite. It is somewhere in the middle or possibly even toward the tail end of it.

Thank you.

[The prepared statement of Dr. Stierman, plus attachments follow:]

PREPARED STATEMENT for the STRINGFELLOW HEARINGS
GLEN AVON, CALIFORNIA APRIL 22, 1983
U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
Speaker:
DR. DONALD J. STIERMAN, ASSISTANT PROFESSOR
THE UNIVERSITY OF CALIFORNIA, RIVERSIDE

Understanding of and appreciation for the geologic framework are essential to the safe operation of landfills containing hazardous substances. The fact that the Stringfellow disposal site did not perform in an acceptable manner was due, for the most part, to geologic and hydrologic factors which were overlooked, poorly understood or ignored. Efficient clean-up strategy for those hazardous waste sites requiring remedial action must likewise be based on a thorough comprehension of and respect for the relevant geologic elements. I will use a series of slides to provide a brief overview of geologic factors which have contributed to the current situation. I will then briefly discuss what is known regarding the distribution of pollutants in the geologic materials in Pyrite Canyon, after which I will point out some fundamental questions which remain to be answered. Finally, I will suggest a method by which contamination currently distributed in the fractures of the granitic rocks might be controlled.

The first slide (air photo AXM-6K-56) was taken on September 22, 1953. That property which will become the waste disposal site can be examined in its natural condition. I wish to point out four elements of geologic interest.

First, there is a trail leading to a spring near the head of (what will become) the Stringfellow waste disposal site. This spring flows from the granitic and metamorphic bedrock, rocks which were called "impermeable" by the engineer in charge of investigating the proposed disposal site (Bookman, 1955).

Second, the "grain" visible in the rocks northwest of the proposed site is a well-developed set of southeast-trending vertical joints. Joints are natural fractures commonly found in otherwise massive igneous rocks. The existance of these joints was in general overlooked or ignored. In one engineering report (Neste, Brudin & Stone, 1973) it was written that "The granitics are unusual in that they are massive, generally unfractured or unjointed." Although granite has a low intrinsic permeability, joints and fractures provide pathways by which fluids can move through these rocks.

Third, Bookman (1955) discussed a "natural dike or barrier" extending across the canyon that was "composed of well cemented gravels, cobbles, and boulders and appears to be impermeable." Although it was recognized that this structure was in fact alluvial in origin, there is no evidence that anyone questioned the assertion that the structure was indeed impermeable. Aside from the fact that most geologists would recognize that the "cement" probably extended but a few inches below the surface, a precedent did exist in the experience of southern California engineering geologists. The failure of the St. Francis Dam on March 12, 1928, was in part due to disintigration of a rock which appeared strong when dry but which become unglued then submerged.

A major leak from the Stringfellow waste disposal lagoons was uncovered in October of 1981 traversing this "impermeable barrier".

Fourth, this ravine, which drains approximately 320 acres of

fairly steep terrain, was blocked by a concrete dam. Ditches dug to detour runoff around the site were inadequate to handle the storms of 1969 (Bryant, 1972), 1978 and 1980.

These oversights had serious consequences. Subsequent engineering decisions were predicated on the accuracy of authoritative assertions regarding the integrity of the rocks in Pyrite Canyon and on the assumption that the geologic conditions there were sufficiently well understood. These assumptions resulted in numerous instances where the engineers were surprised by conditions encountered underground. These surprises resulted in unanticipated delays and expense, and often mandated stop-gap measures.

The second photograph (AXM-4HH-22) was taken on May 15, 1967, about 11 years after the site was opened to dumping. About 17 million gallons had been deposited onsite. The major point of this photograph is evidence that the site is not performing as designed. Fluid is escaping from the disposal lagoons and is collecting behind the barriers built across the ravine. A second barrier has been built upstream of the original barrier to capture this seepage. These are the barriers which failed to contain the runoff during floods in 1969 and 1978, allowing contaminated fluids to flow through Glen Avon.

The third photograph shows the site in 1975. The site is closed. The original disposal lagoons are dry, but the ravine still contains acidic liquid wastes. A new dike has been built below the original barrier across the canyon to catch leakage from behind the concrete dam. Again, I wish to call to your attention the impressive jointing present in these granitic rocks.

The next slide shows how these fractures appear when exposed in a trench. Such narrow cracks can carry water. Numerous household basements have been flooded by cracks which are considerably less visible. Fractures such as these pervade the shallow granitic rocks of Pyrite Canyon. Although the fractures tend to decrease with depth, exploratory drilling conducted by Woodward-Clyde Consultants encountered some fractures 200 feet under the surface. The next slide shows some of these fractures as they appear in the core samples. The granite and schists shown in this slide are unweathered but are moderately fractured..

Figure 1 (attached) shows how deeply contamination has penetrated the granitic rocks near the location of the concrete dam (Stierman, 1983). Heavy concentrations in the upper 75 to 85 feet probably reflect the filling of originally empty fractures with concentrated waste fluids. The original water table during the dry cycle of years was probably located at that depth. Below 85 feet, the concentration of chromium remains well above the background level, determined by attempting to extract chromium from granitic rocks collected from areas known to be uncontaminated. Chromium persists to a depth of 150 feet.

This contamination is not restricted to one set of fractures. Figure 2 shows that contamination in the granitic rocks underlying the site is probably pervasive and probably extends to depths of 100 to 150 feet, possibly deeper. Figure 2, reconstructed from driller's logs for exploration holes B-1, B-2, B-3 and B-4, shows conditions in the bedrock.

Different rock types are indicated by different symbols, and the numbers superimposed on the figure show the amount of chromium, in parts per million, extracted from core samples.

If this change in the contamination pattern at 85 foot depth is due to dilution of the acid waste by ground water, offsite flow of contamination through the granitic rocks must also have occurred.

Downstream from the site, a ground water pollution plume is moving toward the south. There is some evidence that this plume extends beyond the previously installed interceptor wells (Stierman, 1983). We have used geophysical methods to map part of the pollution plume and have concluded that contamination extends to about halfway between monitoring wells MW-10 and MW-11 (Figure 3). Fluid samples from MW-10 reportedly were not contaminated (Barto and others, 1981), but the electrical conductivity suggests that a shallow zone of contaminated water overlies uncontaminated water. MW-10 is not perforated above the depth of 40 feet, which is approximately the base of our low-resistivity (contaminated) ground water zone. This points out the important fact that a pollution plume is 3-dimensional; it has length, breadth and depth. This plume should be mapped in its three spatial dimensions as well as its temporal dimension (how rapidly is it moving south ?) so that it can be intercepted and kept out of the aquifers downstream in Glen Avon.

I have demonstrated that electrical resistivity measurements can be used to map the location of contaminated ground water in the alluvium in Pyrite Canyon. I have not had the resources to conduct a comprehensive mapping project there. Geophysical methods do have limitations; our electrical measurements can be distorted by horizontal buried pipes (vertical wells present no problem), conductive fences or large metal objects in contact with the ground. Sometimes the geologic conditions themselves limit our ability to probe the rocks. In Pyrite Canyon, we can not yet electrically distinguish contaminated from uncontaminated granite if that granite is overlain by contaminated alluvium. However, my students and I can use electrical methods to detect and map the pollution plume in the alluvium of Pyrite Canyon and will complete this necessary task if provided with the resources to do so. Repetition of these measurements every few months in the vicinity of the front of the pollution plume will determine the rate at which the plume is moving.

Exploration for the pattern of contamination in the granitic rocks remains a more difficult problem. A series of shrewdly placed exploration wells will be needed to locate and characterize offsite migration of pollution in the fractured granite. As in the oil or mining industry, exploration and definition of the resource is an important prerequisite to its efficient extraction from the earth.

How can we deal with the contaminated water present in the fractured granite, once we know its vertical and lateral extent ? Grouting has not, to my knowledge, been demonstrated one hundred per cent effective in blocking the flow of fluids through fractured rocks. There is no guarantee that a grouting program will intercept every fracture or that grout will hold up in perpetuity. New fractures may open in the granite (no one knows how fractures such as those found in these rocks form under natural conditions).

Isolating contaminated material onsite will require perpetual vigilance. Excavation of the entire volume of contaminated rock is out of the question. Even if money were no object, such a massive mining operation would leave a hazardous open pit. An alternative is available. The contaminated fluids in the fractures might be controlled by using methods currently employed by the oil and gas industry to enhance production in low-permeability rocks, draining and pumping the contaminated fluids and removing them from the site. Ultimately, this will remove most of the contaminated fluid currently held in the fractures. Water naturally entering the head of the site will eventually flush much of the contamination from the fractures.

Preliminary studies are needed to design such a project. Once the extent of this contamination is known, an engineering firm with experience in designing hydraulic fracturing would have to be contracted to plan, monitor and evaluate the success of the extraction project. Just as interceptor wells must be used to remove contaminated water moving in the alluvium downstream from the site, sand drains generated by hydraulic fracturing would capture fluids flowing in the granitic rocks, direct these fluids to sumps and thus prevent the escape of these fluids from Pyrite Canyon.

In summary, some facts relevant to selecting an ultimate clean-up strategy of Pyrite Canyon remain poorly determined. These include the spatial distribution of contamination in the alluvial materials in the canyon, the distribution of contamination in the granitic rocks, and the speed with which the contamination is moving through these materials. Artificial drains generated by hydraulic fracturing should be examined as a method for extracting contamination from granitic rocks underneath and downstream from the site. Prior to designing such a program, exploratory work is still needed to define the extent and magnitude of contamination in the geologic materials of Pyrite Canyon.

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FIGURE CAPTIONS

Figure 1: Concentration of chromium extracted from fractures in granitic rocks underlying the Stringfellow site. Arrow shows the range of chromium extracted from control samples thought to contain no contamination, and samples lying within this shaded area can not be distinguished from background and are probably not contaminated. One contaminated rock collected from the shore of a disposal lagoon yielded 46.7 ppm chromium. The heavy horizontal line shows the speculative location of the natural water table. Detectable contamination persists to nearly 50 meters (150 feet) deep.

Figure 2: Interpretive cross-section of bedrock conditions underlying the southwest edge of the Stringfellow waste disposal site. Lithology was take from driller's logs provided by Woodward-Clyde Consultants. Numbers superimpopsed on wells B-1 through B-4 indicate the concentration of chromium extracted from fracture residue at that location. "L" shows test samples which yielded chromium levels too low to distinguish from uncontaminated control samples.

Figure 3: Electrical resistivity cross-section showing contamination underlying monitoring wells downstream of the Stringfellow site. Heavy line shows resistivity-depth relation under sounding points taken on monitornig wells MW-7 through MW-11. Low resistivity in shallow layer under MW-10 may indicate contamination not sampled by that well.

APPENDIX I
GLOSSARY OF GEOLOGIC TERMS

alluvial: pertaining to alluvium.

alluvium: detrital deposits resulting from the action of flowing water.

bedrock: any solid rock exposed at the surface or upon which unconsolidated material (such as alluvium) rests.

cement: chemically precipitated material occurring in the pores of clastic rocks (rocks comprised of detrital materials).

chromium: a metalic element often used in electroplating. This element is not abundant in granitic rocks but is common in the wastes deposited at the Stringfellow site. Water quality standards set the maximum concentration for chromium in drinking water at 0.05 ppm.

driller's log: written record of conditions encountered while drilling a well.

electrical resistivity: the capacity of a material to transmit electrical current. High resistivity impedes the flow of electrical current. In fluid-saturated rocks, electrical resistivity is controlled by the porosity (high porosity -> low resistivity) and the electrical resistivity of the fluid (low fluid resistivity -> low rock resistivity). Fluid resistivity is a function of minerals or salts

carried as solutes in the water: resistivity decreases as the quantity of dissolved impurities increases.

geologic: pertaining to natural materials comprising the Earth and the natural processes influencing those materials.

geophysical: pertaining to the use of the physical properties in the characterization of or exploration for geologic materials.

granite: granitic rock comprised mostly of alkali feldspar and quartz (it has a specific mineral range).

granitic: a family of rocks which formed deep underground by crystallization of molten rock. In this testimony, granitic includes gabbro, diorite, tonalite, granodiorite, quartz monzonite, quartz diorite and other similar plutonic rocks composed mostly of quartz, plagioclase and/or alkali feldspar. For all practical purposes, mineralogic differences between rocks of this family have little or no influence on the mechanical behavior of the rock. For engineering purposes, they are essentially identical.

hydraulic: pertaining to pressurized fluids.

hydrologic: pertaining to the behavior of surface and/or underground water.

igneous: a family of rocks which formed by crystallization of molten rock.

impermeable: incapable of transmitting fluid.

joint: natural fracture in rock along which no significant movement has occurred.

metamorphic: a family of rocks which have been transformed in their mineralogic or structural makeup by heat or pressure in the Earth.

permeable: capable of transmitting fluids.

permeability: the quantity which determines the rate at which a material is capable of transmitting fluids.

schist: one type of foliated metamorphic rock.

water table: depth below which free water can be derived from rocks: the free-standing equilibrium level of water in a well.

weathering: the group of processes that break down rocks physically and chemically. Weathering eventually converts rocks into soil. In granitic rocks, these processes cause the rock to crumble as mineral grains become disassociated. Chemically, weathering of granitic rocks involves invasion of water into the rock and conversion of some framework silicate minerals to clays.

APPENDIX II

Additional information regarding hydraulic fracturing can be obtained from:

Dr. Gary Holzhausen, President
Applied Geomechanics Incorporated
1336 Brommer St.
Santa Cruz, CA 95062
(408-462-2801)

Dr. Holzhausen has developed methods for predicting the size and orientation of fractures produced during hydrofrac operations. He has also developed methods for monitoring the location of the fractures as they form in the earth.

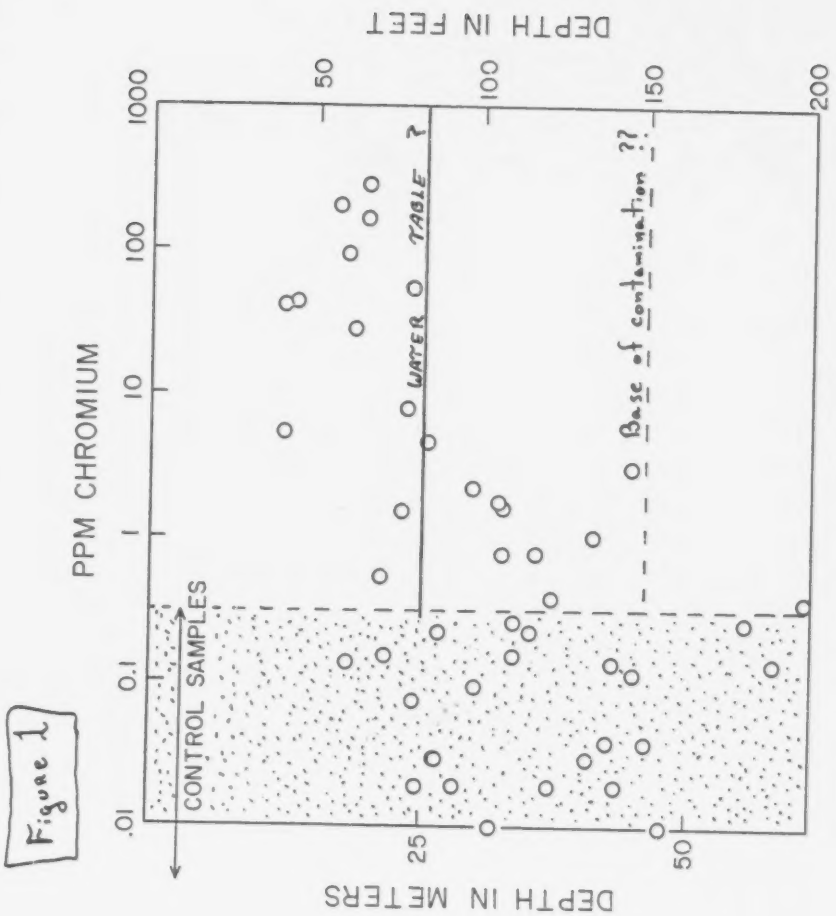
DEPTH IN FEET
50
100
150
200
1000
100
10
1
0.1
.01
PPM CHROMIUM
WATER TABLE ?
Base of contamination ??
CONTROL SAMPLES
25
50
DEPTH IN METERS

Figure 1

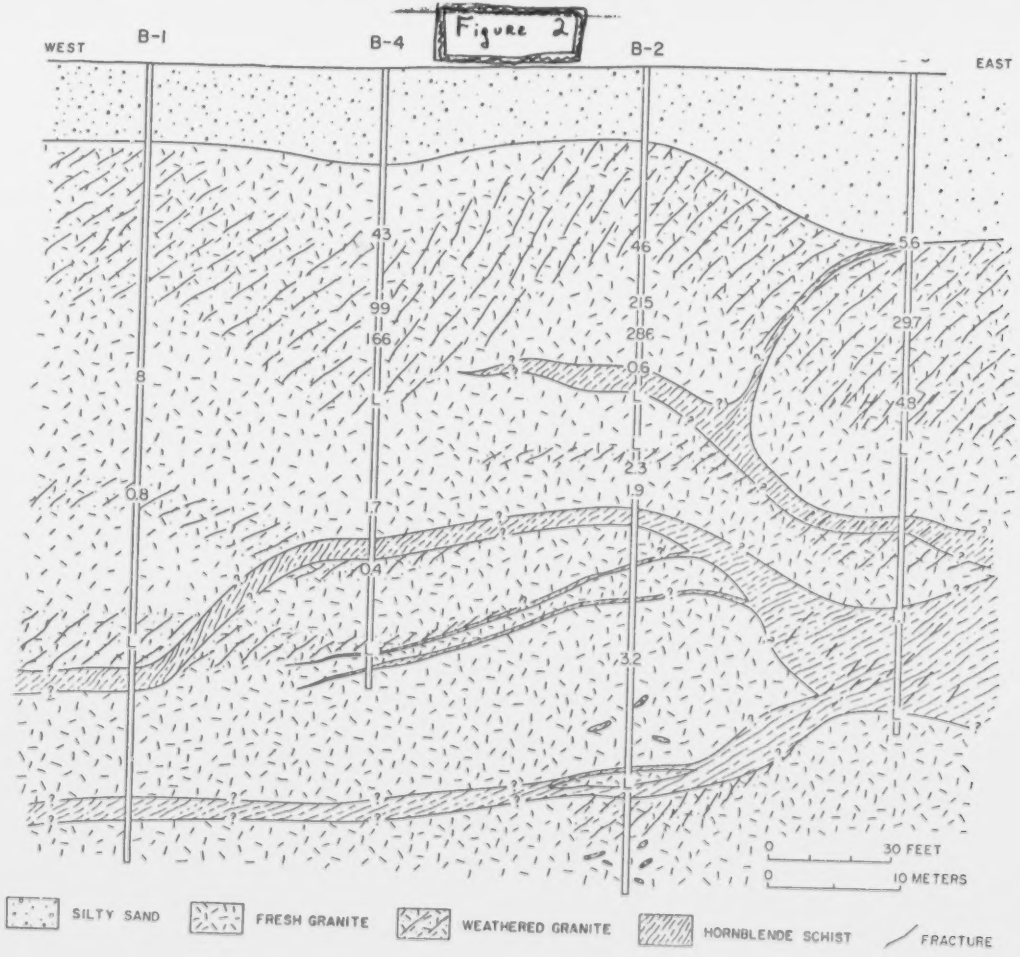
Figure 2
WEST
B-1
B-4
B-2
EAST
43
99
166
8
0.8
1.7
.04
.46
2.15
2.86
0.6
2.3
1.9
.32
5.6
2.97
.48
0 30 FEET
0 10 METERS
SILTY SAND
FRESH GRANITE
WEATHERED GRANITE
HORNBLENDE SCHIST
FRACTURE

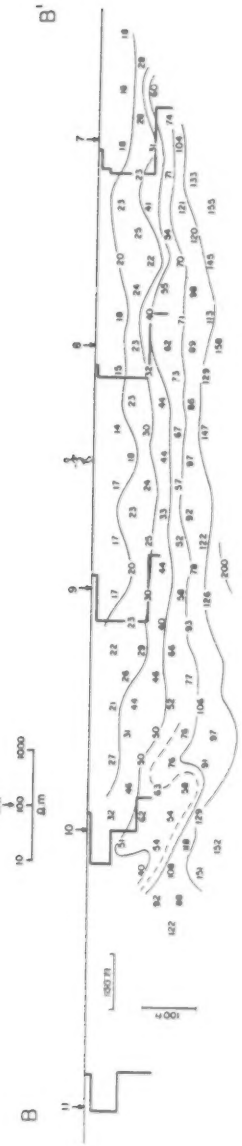

Figure 3

Mr. BROWN. Thank you very much, Dr. Stierman.
Mr. Kazarian.

STATEMENT OF KENNETH B. KAZARIAN, VICE PRESIDENT, BKK CORP., TORRANCE, CA

Mr. KAZARIAN. Mr. Chairman, honorable members of the committee, I will make a few brief statements and ask that my written text be entered into the record.

Mr. BROWN. It will be entered into the record in full.

Mr. KAZARIAN. Thank you, sir.

In October 1981, Governor Brown started a move in the State of California to lower the dependence on direct landfilling of liquid hazardous wastes. In response to that, BKK Corp. being the operators of a class I landfill in southern California and wishing to stay in the business of managing hazardous waste for its customers underwent a very strong research and development program to come up with methods for economically treating liquid hazardous wastes, which were being generated and which are now being disposed of in our landfill and are very similar to those wastes which were disposed of in Stringfellow.

During that research and development program, the leachate was being collected at Stringfellow and has been deposited at our landfill and we underwent a research and development program to detect or come up with a way of treating the leachates which are now being generated.

At this point in time we have a system which we have developed and we have the results and the resultant cleanup takes care of the organics and the heavy metals. We end up with a clean water discharge, which can meet sewer standards and actually we can go clear to Federal drinking water standards with the leachate and end up with a filter cape, which has the heavy metals encapsulated into a nonwater soluble state, which represents approximately only 20 percent of the original volume collected. That would still go to a landfill, but it is in a much less mobile state and represents a much lower volume needing ultimate disposal.

So, we were asked to come here to talk about treatment. I have to agree with the statements made before me that there are treatment technologies available and usable today. Many of them, the economics may be questionable, but I must add that the question of economics is not merely one of the producers who produce the waste not wanting to spend the money. We have many generators who would like to use treatment today, but as long as lower cost alternatives are available, they will be at a competitive disadvantage in using higher expense alternatives when the competitors may still be able to have legally cheaper alternatives.

I would like to take this opportunity to invite the members of the committee to come to our landfill, see our demonstration project and we can show you that we can treat the materials coming out of this site now.

We are not—and I would like to make this clear—we are not prescribing what the ultimate cleanup should be of this site. We have watched the studies and we know that containment and treatment of the liquids has been one consideration, either for short-term or

for long-term methods and we are merely stating that if that is chosen, we are able to do it.

Thank you.

[The prepared statement of Mr. Kazarian follows:]

TESTIMONY OF THE BKK CORPORATION
ON ALTERNATIVE TECHNOLOGIES
FOR THE TREATMENT AND DISPOSAL OF HAZARDOUS WASTES

The occasion of this testimony is a joint Congressional and California State Assembly committee inquiry into the progress of state and federal efforts to complete federally mandated clean-up of designated abandoned hazardous waste sites. The Stringfellow site is an appropriate case study, and we are pleased to offer our comments on the treatment and disposal alternatives.

The BKK Corporation operates solid waste and hazardous waste disposal facilities in several locations in Southern California. We have been in business for many years and have experienced transitions in technology ranging from backyard incineration of solid household wastes that was at one time common in the Los Angeles area, to modern state-of-the-art hazardous waste treatment facilities, such as the one we have just completed in San Diego County.

Based on our experience, I can say without qualification that the sophistication and type of disposal that is utilized by private industry is purely a function of government regulation, including the indirect effect of competition from government operated disposal facilities.

Using the Stringfellow site as a case study, the evidence is clear that the type of waste disposal used at Stringfellow, i.e., surface impondment/evaporation pond was dictated by the prevailing regulatory

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Testimony by Kenneth B. Kazarian, Vice-President, BKK Corporation, April 22, 1983 at the Jurupa Junior High School, 8700 Galena, Glen Avon, California. Testimony was delivered to a joint hearing by the Sub-committee on Natural Resources, Agricultural Research and Environment of the House Committee on Science and Technology and the California State Assembly Committee on Consumer Protection & Toxic Materials.

scheme. There were no regulatory restrictions on toxic air emissions, and land disposal was believed to be the most cost-effective means of disposing of hazardous waste in the region. In retrospect, we now know that evaporation ponds may emit high levels of toxic air emissions and that the long term costs of land disposal may be considerably higher if facilities are not properly maintained. Also in retrospect, we now know that if alternative treatment technologies had been employed to neutralize, dewater, and otherwise detoxify the wastes placed in the Stringfellow ponds we would not be in the unfortunate situation we face today.

The reason that Stringfellow type wastes were not treated then, and why similar wastes are continuing to go untreated into evaporation ponds and landfills today, is that treatment is more expensive. The same regulatory disincentives for treatment of hazardous waste before they are placed in ponds, landfarms, and landfills that existed when the Stringfellow site was operating, also exist today. All that we can say for ourselves as a society is that proposed RCRA standards would require that these land disposal facilities be better engineered. Yet even these standards presuppose that land disposal facilities would pose a risk to underlying groundwater.

As the operator of a Class I hazardous waste landfill that underwent rigorous scrutiny for many years before hazardous wastes were allowed to be disposed there, we believe that in instances where there is no underlying groundwater, untreated liquid hazardous waste can be safely disposed of in land disposal facilities. However, these sites are few and far between and there are many that believe that another

landfill or evaporation pond facility capable of accepting Class I materials cannot be sited anywhere in the state, because of widespread public opposition; largely due to experiences such as Stringfellow. In addition, off-site land disposal facilities account for only a small fraction of the hazardous waste disposed of in the state. Adding more off-site evaporation ponds and landfills will hardly begin to address the need since the vast majority of hazardous wastes generated in this state are disposed of either in municipal sewers or in on-site landfarms and evaporation ponds.

To avoid future "Stringfellows" and to assist in cleaning up the Stringfellow site, alternative treatment technologies can be employed. We do not recommend any specific technology, but can assure you that proven economical technologies do exist for a wide spectrum of waste products commonly encountered in the state. For example, with our treatment equipment we have demonstrated an ability to effectively treat Stringfellow leachate, and in fact, have made a proposal to the State to treat the leachate under an existing contract in lieu of transporting the waste to our Class I landfill. We have also constructed and are now operating a hazardous waste treatment facility in San Diego County that is capable of treating most of the types of waste that were originally placed in the Stringfellow site. We believe we will be able to compete with existing cheaper landfill and evaporation pond facilities because those facilities are located a great distance from San Diego County and higher transportation costs generally offset higher treatment costs.

Rather than detailing how our treatment processes work we will

simply extend an invitation to the committee members to inspect our facilities. We would only emphasize again that in our view, the Stringfellow issue is not a technical issue. The technology exists to evaluate the problem, assess the environmental risks, and effectate a clean-up plan. The issue is economics. In this case the less expensive clean-up options may be treatment of wastes on-site rather than excavation and removal to a landfill, unless of course incineration of all solids is considered.

If you have any questions about particular treatment technologies I would be pleased to answer them at this time.

References

1. Technologies and Management Strategies for Hazardous Waste Control; (1983). Congress of the United States, Office of Technology Assessment, Library of Congress Catalog No. 83-600706.

2. Alternatives to the Land Disposal of Hazardous Wastes, An Assessment for California; (1981). Toxic Waste Assessment Group, Governor's Office of Appropriate Technology, State of California.

Mr. BROWN. Thank you very much. That is rather encouraging. [Applause.]

Now, our last witness is Dr. Donald Whorton of the University of California School of Public Health and we appreciate your patience, Dr. Whorton.

STATEMENT OF DR. DONALD WHORTON, ASSOCIATE PROFESSOR, SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF CALIFORNIA, BERKELEY, CA

Dr. WHORTON. Mr. Chairman, Assemblywoman Tanner, members of the respective committees, I would like to talk briefly about epidemiology, which has been referred to earlier today. I will talk in general about how epidemiological studies are done and what can be done at a waste site.

If one examines waste sites, one only have to look at a few to realize very quickly that each one is different. So, unlike many studies—and if one can look at a couple, one can therefore extrapolate to all, with waste sites one can not do this.

The other consideration is that in waste sites there may be a few chemicals to a hundred chemicals to thousands of chemicals. Our understanding of the toxic effects of these chemicals is very limited. Generally, the most understanding we have on chemical toxicology has to do with acute effects or short-term effects. We have much less knowledge about the long-term chronic effects, the mutagenic effects, the carcinogenic effects, or the reproductive effects.

Our understanding of potential toxic effects of chemicals lags considerably behind our ability to synthesize or to use such chemicals. If, our knowledge of the toxic effects of chemicals that are commonly used is not known very well, our understanding of those chemicals is inside the chemical waste dump even less known. Because chemical reactions can and do occur in such a waste dump, new chemicals develop.

In addition, most of our toxicology is based on one chemical at a time. We do not really understand very well all the various potential combinations and interactions.

With this as a background, I would like to discuss how one can approach evaluating the health effects of a community surrounding or adjacent to a waste dump. There are several things one has to think about.

No. 1, what is the nature and type of chemical and other toxic materials in the dump? It is important in trying to assess what kind of a study to do to have some general understanding, as much as possible, of what are the hazardous wastes. As an example, if one little tiny fraction happens to be a carcinogenic metal and everything else is some type of a solvent, one should be more concerned about the solvent. Perhaps the other metal may actually just be a minor contaminant in just one area of the waste site.

The route of exposure is important. The community could be exposed either by the airborne route, by water, either surface or ground water—my understanding in this situation it could be both—or by direct contact: direct contact by the residents of the community going to the site, children playing on the site, residents taking materials away from the site.

There have been other situations in which waste materials have been used in building materials; an example is homes in western Colorado from uranium mining tailings or the use of waste oil contaminated with dioxin which was sprayed in Missouri. Houses have been built on top of a waste site, which happened at Love Canal. Materials can contaminate the food chain, like methyl mercury in Miramata Bay, Japan.

Now, the type of anticipated adverse health effects is very important. If the major concern is cancer, and the site has been there 3 years, one can do a study but one will not find anything because it is very unusual for any chemical carcinogen to act that quickly. Most chemical carcinogens take a number of years to act or to produce cancer in the population that is exposed.

It is also important to know the frequency of the various diseases that one may see in the population. If, for example, one is concerned with lung cancer as the major disease, there is a certain number of individuals with lung cancer in the general community. If one sees three cases of lung cancer, does that mean it is due to the site? No. It may be the fact that these three individuals are all heavy cigarette smokers, a well-known cause of lung cancer.

It is important in understanding what we know about the various diseases. Now, there are currently various data bases available in some communities in different States that are maintained by either governmental agencies or university programs. Examples are birth and death records. Birth certificates are kept by every State. Several parameters can be assessed; the number of births, birth weight, obvious malformations or birth defects, fetal and infant deaths. One can look at the residents in the area, assuming that the county has the information based on location, and determine if there has been an increase in any of these effects in that community. One can plot these results by census track on a map. There are many other simple methods of evaluating these data. The same thing can be done with death certificates.

One of the problems with death certificates is that one ascertains where the person died or the last residence. The person may have recently moved to that particular residence. A problem with any kind of community study is mobility of the population.

In locations in which there are population-based tumor registries, about 10 percent of the country is covered by such a tumor registry, one could evaluate incidence of cancer, new cases diagnosed with cancer, in various populations and do comparisons.

Last, in some States—South Carolina is an example—all non-Federal hospital hospital discharges are reported by diagnosis. Again, one could look at the community of interest and compare it to other similar communities in the State to see are there differences in particular types of disease.

Now, in many situations one is still going to have to go out to the community to do some type of a study. The general study that is done first is some type of a questionnaire study, a mailed-out questionnaire, a telephone questionnaire or a door-to-door questionnarie. The mailed-out is the cheapest. The door-to-door is the most expensive.

In developing such a study one has to use a questionnaire that has been tested and validated and that can be analyzed meaning-

fully. In addition, one needs a comparison population, comparable in socioeconomic status, racial and ethnic background, in order to evaluate the information from this community. As an example, a study in community one found 20 percent of the people there complain of headaches. Well, if the comparison community had a headache rate of 5 percent, the difference would be more meaningful that is if the comparison rate were 19 percent.

Based on the evidence of the initial survey or from some other type of information one may want to do more investigation, which might include some type of physical examination or biological sampling. However, then the more one does, the more expensively difficult the study becomes. In any investigation one has to proceed in a very logical and orderly manner. All too frequently a poor study is done initially. After a poor study is done, the water is so muddy that a well-designed study cannot be done or its meaning has been clouded.

Another issue for the investigator to remember is that any study, no matter good or bad, is liable to become entangled in litigation; the investigator has to be prepared for such an outcome. Unfortunately, in many situations, the investigator is not prepared for the litigation that follows such studies.

Who should conduct such epidemiologic studies? Traditionally, the responsibility has been the local or State health department. However, not all States, and even fewer counties, have the expertise or the staff to do this and those who have the staff usually have other duties to do. So, either their priorities have to be changed or there has to be more funding to beef up those staffs.

At the national level, the organization that has the best record for doing epidemiolgy is the Centers for Disease Control. However, with the enormous number of waste dumps, unless there is going to be a massive infusion of funds and growth in the agency for that purpose alone, they cannot possibly do all the required studies.

Universities traditionally have done research by grant mechanism. Universities have not always been able to be responsive on very short term contractual arrangements. In addition, many universities are not generally anxious to have their trainees or students involved in studies that are almost certain to generate legal action.

The private sector health organizations and consulting firms will have to be invited to participate in such studies if the previously described organizations are unable to do them. In that case, I think, the expertise and the capabilities of the organization should be the primary consideration and not the cost.

Now, one final item I would like to address is what type of followup studies should be done after the mitigation is completed. Followup studies of a population are very expensive. People move. I have seen situations where someone proposes to mail a followup questionnaire to the residents every 5 years to see how they are doing. Well, that is fine, but in 5 years one may have a new set of residents; trying to find the original set of residents can be very difficult and expensive.

There is another mechanism available if one is interested in death as an outcome. Three years ago the National Center for Health Statistics has developed a national death registry, which re-

ceives information on all deaths in the United States annually. By using this death registry one can conduct limited mortality evaluation provided one has certain demograph information like name, social security number, address, and so forth.

Now, in closing, I would advocate an objective health assessment be done on populations exposed to toxic waste dumps where a health hazard is suspected. In most cases, one cannot rely upon the paucity of animal toxicologic data to assure the residents of their personal safety. Any study must be done carefully and prudently by individuals and organizations with appropriate expertise. I do not think the EPA should do health studies. As the Agency responsible for enforcement, they have an inherent conflict of interest in doing such studies.

Decisionmakers at all levels of government and industry must remember that the residents of the community deserve and expect to know the risk they sustain for living adjacent to a dump site.

Thank you.

[The prepared statement of Dr. Whorton follows:]

Testimony of M. Donald Whorton, M.D., M.P.H.,
before the Subcommittee on Natural Resources, Agricultural Research, and Environment
of the House Committee on Science and Technology
and the State Assembly Committee on Consumer Protection and Toxic Materials

Glen Avon, California
22 April 1983

Mr. Chairman, members of the House Subcommittee and Assembly Committee, and other interested parties, my name is M. Donald Whorton. I am pleased to be invited to present my views regarding the need for health and epidemiologic research related to chemicals in the environment associated with toxic waste disposal. I am a physician whose expertise is occupational and environmental medicine. Inherent in this work is both epidemiology and clinical toxicology. I am employed with a private consulting firm, Environmental Health Associates, and part-time by the School of Public Health, University of California, Berkeley, as Associate Clinical Professor of Occupational and Environmental Health.

I will limit my remarks here today to discussion of waste disposal dumps. Public concern about disposal of toxic wastes, increasing during the past few decades, seems to have been catalyzed by the events at Love Canal in Western New York State.

If one examines a small number of waste dumps, one obvious conclusion is that each site is somewhat unique. One cannot study a few and develop general conclusions about all such sites. If the dumps contained identical wastes, one could extrapolate scientific findings of one to the other with certain restraints. This situation will occur in only a few dump sites, however.

Based on information in the public realm and the definition of a dump site, there may be hundreds to thousands of waste dumps throughout the United States. The number of different chemicals in any particular dump site may range from a few to hundreds

to thousands. In addition to the original chemicals placed in the site, new ones will be generated by chemical reactions associated with chemical mixing and interactions.

While many thousands of chemicals may be involved in dump sites, the general information on the toxic effects for many of them is limited. The toxicological knowledge concerning most chemicals for which we have such information is limited to acute or short-term effects. The usual type of acute toxicological information is the lethal dose in rodents (LD_{50} in rats, mice, etc.) and acute irritant effects as to the general health effects on rodents fed the chemical over 3-12 months. Much less is known about the potential for carcinogenesis, mutagenesis, reproductive effects, etc. In general, our understanding of the potential toxic effects of chemicals lags considerably behind our ability to synthesize and use such chemicals.

If our knowledge of the toxic effects of the individual chemicals placed in a toxic waste disposal site is limited, our understanding of the effects of new chemicals generated by chemical reactions occurring in the site is almost non-existent. Similarly, our knowleuge about effects of combinations of chemicals is also rudimentary at best.

With this as a background, I would like to discuss how one can approach evaluating health effects from a toxic waste disposal dump or the adjacent community. Several factors must be considered in any epidemiologic assessment of health effects on the community:

(1) Nature and type of chemical and other toxic materials in the dump site. The issue of toxicological limitations was discussed previously. One should remember that any assessment of the contents of the dump site must

be comprehensive enough to adequately describe the type and concentrations of the different substances.

(2) Route of exposure. The following are the various potential routes of exposure:

(a) Air

(b) Water - surface and/or ground

(c) Dirt contact

(1) Children or adults gardening or playing on the site

(2) Use of site material for construction or other purposes, e.g., radioactive mine tailings in Western Colorado, and tetrachlorodibenzodioxin in Dixon

(3) Homes or other residential structures on or over a partially covered site, e.g., Love Canal and asbestos mine tailings in Arizona

(d) Contamination in the food chain, e.g., methyl mercury in Miramata Bay, Japan

(3) Type of anticipated adverse health effects. Based on the limited information available from the toxicological assessment and route of entry, one attempts to determine types of biological effects one could see in the community. If the primary concerns are diseases in which a long latency period exists (e.g., cancer), one would not expect to see effects for many years. It is also important to determine the frequency of the predicted diseases in the population, plus other con-

founding factors which contribute to the disease. One issue in any epidemiologic study is the potential to find adverse effects if they are truly there (sensitivity of the study). The other important aspect to any epidemiologic study is reliability of positive findings - are they present just by chance or are they associated with the exposure (level of significance)?

(4) Utilization of data currently maintained by one or more governmental agencies or university programs. All states maintain certain vital statistics on their populations. Most common are birth and death records.

Birth records can be used to assess several parameters: number of births, birth weight, obvious malformations (birth defects), fetal and infant deaths. If the data are kept by the local or county health department, one can compare the census tract around the site to other county census tracts. One can also plot adverse events using the dump site as the zero point.

Death certificates can be utilized to determine causes of death among residents of the census tract compared to the remainder of the county.

In locations or states in which population-based tumor registries exist (SEER* programs sponsored by the National Cancer Institute, plus some others), one might evaluate cancer incidence of the residents compared to the remainder of the county, state, etc. Unfortunately, only about 10% of the U.S. population is covered by such a program. Furthermore, population mobility severely limits this approach.

Other types of data bases include hospital discharge diagnoses. An example of such a program is the one in South Carolina, where hospital discharges from all non-federal hospitals are collected. Again, the hospital use patterns of residents of an affected area can be compared to other groups.

All of the previously described methods of evaluation assume the data are coded in such a manner that address can be ascertained.

(5) Feasibility of conducting an appropriate health effects survey or other studies. A questionnaire survey to evaluate potential health effects on the residents is a standard epidemiologic study. However, the questionnaire must be properly tested, validated, and analyzed to be meaningful. A comparison neighborhood, similar in socio-economic, racial and cultural factors, should be surveyed in order to properly evaluate the data from the exposed neighborhood. An independent evaluation of exposure category in the study neighborhood is useful.

Based on evidence of the initial survey, other studies may or may not be appropriate. Such studies might attempt to identify individuals with objective findings who may or may not have corresponding symptoms. Among persons without symptoms, one looks for the subclinical or asymptomatic cases diagnosed by findings alone. For those with symptoms, one corroborates the clinical suspicion through examination and testing. For example, we would use a physical examination and blood chemistry tests to evaluate liver function among individuals exposed to chloroform.

In any epidemiologic investigation of a community adjacent or exposed to a toxic waste dump, there needs to be calm and experienced leadership so that the investigation can proceed in a logical and orderly manner. For example, if a 45-year-old individual seeks medical attention due to the onset of persistent headache symptoms, one does not advise an immediate brain biopsy just because brain cancer is a possible diagnosis for such symptoms. There are numerous other examinations and tests which must be done before one would consider a biopsy. Expertise is needed on several counts. Poorly designed studies often "muddy the waters" so much that a properly designed study done subsequently may be flawed as much as the first. A poorly done study may have irreversibly upset the population. No one is assisted by poor studies. Furthermore, any study (good or bad) will involve the investigation in any subsequent litigation. The investigators should anticipate having to appear for depositions and/or in court if such a suit is subsequently filed.

Who should conduct such epidemiologic studies? Traditionally, the responsibility resides in the local or state health department. However, not all states (and even fewer counties) have the expertise or staff support for such a study. Either more funding to hire appropriate staff or a change in priorities for the current staff will usually be required to conduct such a study.

Considering the large numbers of toxic wate dumps, one cannot expect the Center for Disease Control (CDC) to be the responsible agency for such studies without a massive increase in funding, a major commitment

from the agency, and a willingness on the part of state and local authorities to accept CDC intervention.

Universities traditionally do research via the grant mechanism. Because of community concerns about timeliness of results, many universities find it difficult to meet such time schedules without becoming a contract organization. Responsiveness by universities will depend to some degree upon the nature of the proposed study. Universities are generally not anxious to have trainees and students involved in studies that are almost certain to generate legal actions.

The private sector health organizations and consulting firms will have to be invited to participate in such studies, if the previously described agencies or organizations are unable to fulfill the need. In that case, the expertise and capabilities of the organization should be the primary consideration. Since it is not always clear as to who should pay for such studies, the employment of private contractors will often bring the problem into focus.

As a final item, I would like to address what types of follow-up studies should be done after mitigation activities at the dump site are completed. Long-term follow-up studies are expensive and should be done only if there is adequate scientific evidence that such a follow-up is indicated. The potential for the adverse health condition to occur must be high enough that one would actually find individuals with the condition. For example, if the risk for the general public to develop condition A is 1 in a million and if the estimated risk in the 500 residents adjacent to a particular dump site is 2 in a million, a follow-up study will never differentiate this level of risk.

In closing, I advocate an objective health assessment be done on populations exposed to toxic waste dumps, where a health hazard is suspected. In most cases, one cannot rely upon the paucity of animal toxicologic data to assure the residents of their personal safety. Any studies must be done carefully and prudently by individuals and organizations with appropriate expertise. I do not think the EPA should do the health studies. As the agency responsible for enforcement, they have an inherent conflict of interest in such studies.

Decision-makers at all levels of government and industry must remember that the residents of the community deserve and expect to know the risk they sustain for living adjacent to a dump site.

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*SEER = Surveillance, Epidemiology and End-Results

Mr. BROWN. Thank you very much.

Congressman McCandless.

Mr. MCCANDLESS. Thank you, Mr. Chairman.

Two people on this panel testified directly to the technology of treatment, if I understood your testimony; Dr. Hirschhorn and it says Dr. Kazarian. Are you now a doctor?

Mr. KAZARIAN. I just got my doctorate.

Mr. MCCANDLESS. Do I understand in making an assumption to move ahead on that, the technical know-how is available for the purpose of treating solvents, compounds and other toxic wastes? Is that a correct assumption?

Dr. HIRSCHHORN. Yes.

Mr. MCCANDLESS. But the reason that it is not more widely used is economic primarily in nature?

Dr. HIRSCHHORN. Yes.

Mr. MCCANDLESS. Given that scenario then, where is the high cost, in the initial capital expenditure or the day-to-day cost of operation and maintenance? I leave it up to anyone who might wish to comment. These, I think, are important areas to discuss this problem because we have reached a crossroads of the whole idea of toxic waste and how to dispose of it and this is a direction ultimately we are going to have to go in.

Dr. HIRSCHHORN. There is a very broad range of treatment technologies as I think the last witness rightfully noted. There are literally thousands and thousands of types of hazardous wastes. So, you can imagine that there are many different technologies that can be used and many of these are very capital intensive. One of the reasons why land disposal is cheap is that it is not capital intensive. In fact, you know, you just get a piece of land somewhere and that is it essentially.

Mr. MCCANDLESS. All right. We are running out of time and some others might want—let's take some of the higher volume toxic wastes that we would experience, say, here in California and apply that as a part of the assumption, whatever those might be. I understand what you are saying about a whole broad spectrum of different types of toxic wastes—and then apply what it is that we are talking about to the question that I have asked. Dr. Kazarian is getting in on the act here. He lost his identification on the floor.

Mr. BROWN. Did you offer to contract to dispose of all of the stuff out here at Stringfellow or could you give us a price that you will do it for now.

Mr. MCCANDLESS. George, I am leading up to that now. As an old used car salesman, you have to kind of lay the groundwork.

Mr. KAZARIAN. Well, the whole issue of economics is dependent on the type of material we are talking about. If we talk about the largest majority of wastes which are generated here in the State, the economics are not radically different than what we experience today. They are going to be higher, but not tenfold or twentyfold.

Fortunately here, or unfortunately, depending on what side of the fence you are on, the prices for waste disposal in southern California are probably in the lower 10 percentile for the Nation. So, we as waste managers in searching out systems for treatment have been trying to come up with the most flexible and economical systems.

If we look at many of the compounds which are contaminated with heavy metals or the inorganic liquids, we can find relatively inexpensive systems. But when we start talking about the wider range of solids, the organic materials, some of the solutions are merely incineration or thermal destruction or techniques basically, which get back down to good old fashioned incineration with fancy scrubbers. That has not been a real acceptable alternative in this State because of our clean air concerns.

There are some other techniques which are being pioneered right now, which will destroy organic compounds, but they are basically still in the very beginning of research and development. So, if we can't chemically treat it today, we have to look toward incineration. When we talk about incineration of the solids, we are talking about such a wide diversity of materials, not only by quality or type, but we have solids, liquids. We have some things that are slurried, some things about the consistency of jello, other things like bricks. And to design equipment to take care of those, it is very expensive, but for a large majority, I think we can come up with practical economical solutions.

Mr. McCANDLESS. All right. Now, given the initial expenditure, is there any value—and I am only throwing this out for whatever you may wish to respond—is there any value in a theoretical situation where, say, the Superfund would offer low-cost loans to encourage the development onsite of certain types of incinerators for certain types of cursory treatments or whatever it might be or maybe if the applicant qualified? The Government would sell this on a lease/purchase basis in order to get the people in the business so that there isn't that initial capital expenditure, which is a deterrent, to get us off the idea of land and put us into the idea of machinery. Is this worth any effort of pursuing?

Mr. KAZARIAN. I will be real brief and I will move the microphone over. The initial expenditure is not the biggest problem with the waste management industry as far as our end of the business is concerned. It is proving to the investing community, though, who loan this industry the money that they are going to have the ability to pay it back and that is a function purely of governmental regulation or we heard a discussion on taxation to make it look like a lower cost alternative due to the taxation. We merely can invest in what is going to be used.

As far as onsite is concerned, there are companies treating now, but we have many, many small businesses that generate hazardous waste; plating shops, dry cleaners, you name it. There are small, one-, two-, three-person operations that generate hazardous waste. They can't even understand the Federal Register, let alone figure out how they are going to put together a treatment system that is going to live up to the law. So, it is up to the offsite people to take care of that and that is, again, where we get into our investment.

Dr. HIRSCHHORN. One of the things our report tried to emphasize is that everything that has occurred up to now in the Federal Hazardous Waste Program has not encouraged alternatives to land disposal. We have had officials of EPA testifying for the last year in favor of land disposal. So, I would agree that the public policy, the regulatory situation that exists does not create a certain market for the alternatives to land disposal. It provides no direct economic

incentives for these alternatives and the combination is devastating and that is, we do not see these alternatives being developed and used to their full potential. It is not that it can't be changed. It can be changed, but it just takes a determination to do it.

By the way, in plain, simple economics, we have the tables, of course, in our report, but just to give you a feel, the differential between using land disposal nationally and using an alternative such as chemical treatment or incineration generally ranges from about $50 to $150 a ton more to use the alternatives as compared to using the land disposal. That is a lot of money and that is why people will continue to use land disposal. It is a lot cheaper.

Mr. MCCANDLESS. I would like to thank all four of you very much. Thank you, Mr. Chairman.

Mr. BROWN. Senator Presley. Mr. Clute. Mr. Hayden.

Mr. HAYDEN. I had a question. Am I understanding you, Dr. Hirschhorn, that, No. 1, that the EPA policies up to now have been largely a waste of money? The hour is late and I want to be clear. Are you saying that because of the emphasis on the short term, the emphasis on the clay cap, the absence of any requirements to come up with a permanent solution, that millions of dollars have been spent on solutions that you think are really not solutions.

Dr. HIRSCHHORN. I would say "yes," that the long-term effectiveness of most of the things that have been done are considerably questionable and remember that statistically in the Superfund situation in most cases waste, if it is removed from a Superfund site, it is merely placed in another land disposal site, which is not sufficiently or effectively regulated anyway. So, you may just be creating another Superfund site.

Mr. HAYDEN. So, essentially, if I understand you, you are saying that the disposal technology largely exists, but we just don't want to pay for it.

Dr. HIRSCHHORN. Absolutely.

Mr. HAYDEN. And, third, how would you react to the statements by Mr. Hedeman today, which I don't think was in his verbal testimony, but was in his written testimony, which is as follows: "A few issues are still unresolved. One is the kind of cleanup we undertake and how far we have to take it to adequately protect health and the environment." To me, that is like saying we are going into the hospital, but we don't know whether we are sick or what we have to do or how much we have to do to get well. What is your reaction to this?

Dr. HIRSCHHORN. I was quite shocked, quite frankly. It was the first admission of that that I have ever seen made by an official out of EPA. I want to emphasize that the congressional mandate in Superfund, asking EPA to create the national contingency plan, was to answer the question "How Clean is Clean," and the way EPA did that was to give a nonanswer, which was to create no standards and simply say that on a site-by-site basis somehow we will come up with an answer. It does not work. It has not worked and this is the first public admission that they haven't answered that fundamental question that they were supposed to, that Congress asked them to deal with.

Mr. HAYDEN. One last question: Is it any wonder then that the people in this room are frustrated?

Dr. HIRSCHHORN. I have said this before, that if the public knew as much as we do, those of us who have done nothing but studied the problem of hazardous waste for a few years professionally, the public would actually be more passionately excited about the problem. I really think that if the public had the patience to read these 400 pages they would walk away more disturbed than before they looked at it.

Mr. HAYDEN. Thank you.

Mr. BROWN. Thank you very much, gentlemen. [Applause.]

That concludes the witnesses for this afternoon. I want to thank the audience for their patience and their generally good behavior in spite of everything. I also want to thank all of the members of the panel up here, who spent 4 hours on this important subject. Believe me, it is hard to get your public officials to sit still for 4 hours for almost anything, but you set a very good example for them.

May I also thank the assistant principal of the school there, Walter Lancaster [applause] who went to a great deal of trouble to make the facility available and who has helped us in a large number of ways.

Now, may I have your attention just for another moment? We have a short film, a 6-minute film of the Stringfellow site. I am going to adjourn the meeting because I can't put the film in the record, but if any of you want to see that film, you are invited to remain and I am going to stay and look at this film.

The meeting will be adjourned. Thank you.

[Whereupon, at 6:05 p.m., the subcommittee was adjourned.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

Riverside County Medical Association

3993 Jurupa Avenue • Riverside, California 92506 • (714) 686-3342

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DALE B. SPARKS, M.D., Riverside

April 8, 1983

Congressman George Brown
Mission Inn Rotunda
Riverside, California 92501

REFERENCE: Report to be given as testimony on April 29, 1983, before the Congressional Agricultural Research and Environmental Sub-Committee of the Committee on Natural Resources.

Dear Congressman Brown:

The Riverside County Medical Association has expressed sincere concern about public hazards of air pollution and water pollution in our community. In reviewing minutes of our Environmental Health Committee, as far back as November 21, 1973, we find we first became concerned about potential health hazards in the surrounding community resulting from toxic wastes in the Stringfellow Acid Pits. At that time, we were assured by our local and state public health departments that there was no health danger in the immediate vicinity. In spite of this report, we did work with community leaders in trying to eliminate potential problems and prevent future complications.

In 1977, we had a meeting with Michael Herman, Field Representative for Senator Robert Presley. Mr. Herman described Senate Bills 1130 and 1131 which were authored by Senator Presley in order to rid the neighborhood from acid pit problems. After a thorough discussion and study, the Riverside County Medical Association did indeed endorse and support Bill 1131 which would allow for funding to rid the community of the toxic waste problem.

We understood the funding would come from the State general fund ($296,000) and from the State Water Quality Control Board ($74,000). We understood that the County of Riverside was also expected to participate in funding for this removal.

January 21, 1981, we were again apprised of the problem which had not been corrected up to that date. We had a report from James Anderson representing the Regional Water Quality Control Board. Mr. Anderson assured us that the biggest problem was the elimination of the DDT in the area. Total costs to that date were in the neighborhood of four million dollars and he predicted that the completion time for complete capping and coverage of the acid pits would be November, 1981.

At our meeting of March 23, 1982, we had further progress reports from Mr. Anderson who claimed it would take an additional six million dollars to completely eradicate the toxic wastes at the Stringfellow Acid Pits. Since no action was requested of the Medical Association, we accepted this report and filed it for future consideration.

In essence, our Riverside County Medical Association has been aware of potential health hazards to the patients living in or around the area of the Stringfellow Acid Pits. We know that the toxic elements have found their way into the domestic water lines and would like to offer our cooperation for the study that is now ongoing through the UCLA School of Public Health and Epidemology.

We are particularly interested in the possible health effects from the air pollution of the particulate matter from air transport of the same chemicals and aerosols.

It would be the recommendation of the Riverside County Medical Association that the problem itself be eliminated as soon as possible. If the engineering is not presently available to cap the pits properly, then consideration must be given to completely emptying the toxic wastes and transporting these wastes to a neighborhood less populated than the Glen Avon area.

Sincerely,

Robert M. Zweig M.D.

Robert M. Zweig, M.D.
Chairman
RCMA's Environmental Health Committee

RMZ:ds

cc: RCMA President

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April 18, 1983

Congressman George E. Brown, Jr.
3600 Lime Street
Riverside, CA 92501

Dear Congressman Brown:

Enclosed is a proposal for a method of eliminating toxic waste through thermal decomposition. Unlike existing thermal incineration techniques, this is a sealed system that does not pollute the atmosphere.

Penny Newman has agreed to introduce this proposal at the April 22 hearing as part of her presentation. However, this will have a greater impact if I could be placed on the agenda.

Thank you.

Sincerely,

Samuel D. Huang, Ph.D.
Associate Professor of Biology

SDH/plg

THERMAL DECOMPOSITION OF TOXIC WASTE

Existing conventional methods provide only temporary solutions in the management of toxic chemical waste. Ultimately, a safe, permanent method of toxic waste disposal must be developed. One such method is the use of the Louis Gold Coal Reactor for thermal immobilization or encapsulation of the toxic material.

The Principle of the Gold Coal Reactor

The Louis Gold Coal Reactor (U.S. Patent No. 4,080,196) is based on redirecting the counterflow of gases and solids in a conventional verticle blast furnace through a series of properly placed conduits. In this reaction, the pyrolytic products resulting from the thermal decomposition of the feedstock, together with moisture driven off as steam, are made to react with the hot charge. The net result is the suppression of water and tarry matter in the effluent gas to provide a dry, clean, gaseous product of nitrogen, carbon dioxide, carbon monoxide and hydrogen (U.S. Patent No. 4,080,196-1-line 35). Either the residual heavy metal contaminants are incorporated into and immobilized within the vitreous slag, or the molten mass can be delivered into an exogenous vessel for encapsulation.

Two Regimes of Operation

The coal reactor can be used in two ways to eliminate toxic wastes:

1. Solid toxic wastes in drums, contaminated soil, or wastes transported from other sites, can be fed

directly into the reactor. This method permits an adequate heat balance to generate a carefully tailored slag which incorporates the reacted waste feedstock.

2. The second method is to place the hazardous chemicals in a suitable crucible and pour the molten slag from the reactor into the toxic mixture for encapsulation (U.S. Patent No. 4,331,008-2-line 6).

Thermal Decomposition of Organic Materials

Unlike existing thermal decomposition methods of incineration, the coal reactor is a sealed system which does not allow the toxic gases to escape into the atmosphere. All the toxic organic materials will be pyrolyzed (1500° - 2000°C) into carbon monoxides, carbon dioxides and hydrogens, while the heavy toxic metals are immobilized or encapsulated (U.S. Patent 4,331,008). Inert nitrogen and harmless carbon dioxides can be released directly into the atmosphere (Patent 4,080,196-1-line 40). The carbon monoxide can be collected and sold for the production of ammonia, while the hydrogen can be sold as feedstocks for hydrogenation or fuel (U.S. Patent No. 3,985,320). The collected carbon monoxide can also be converted to hydrogen (U.S. Patent No. 4,004,895). Incidentally, the reactor can also be used to remove municipal waste and provide electricity without contaminating the atmosphere (U.S. Patent No. 4,078,914).

Potentially harmful organic compounds such as methylene chloride, tetrachloroethene and even dioxin can, in theory, be pyrolyzed before they escape into the environment. The slag produced is a mixture of oxides of calcium, aluminia, silica (U.S. Patent No. 4,331,008-1-line 38), which can then be safely

handled for disposal at a reasonable cost (U.S. Patent No. 4,331,008-1-line 43).

Feasibility Study

This proposal is for a cooperative approach to develop a feasibility study for a pilot coal reactor on the Stringfellow Acid Pit site. In theory, a small, fifteen foot diameter reactor could process thirty-five tons of toxic soil per day. The feasibility study will include computer analysis, personnel and construction cost, diagnostic testing, structural analysis, safety, methods of loading, delivering and transportation. Diagnostic tests will consider the cost of using chemical and X-ray analysis to arrive at an understanding of the fate of the hazardous chemical wastes subjected to thermal destruction treatment.

Preliminary Investigations

The liquid run-off from the Stringfellow Acid Pit was collected and quantitatively analyzed by Brown and Caldwell Laboratories (sample collected from pond #2 on 9/7/79). The sample showed the presence of thirteen heavy metals. In order to investigate the feasibility of thermal immobilization, several faculty members from Riverside City College cooperated in conducting a preliminary study, using approximately 300 ml of the analyzed sample. Part of the sample was mixed with clean soil and the other part was mixed with vermiculite. Both mixtures were dried under a hood, added to limestone and charcoal, and placed into a ceramic kiln for firing. The kiln-fired slag was cooled and placed in a jar filled with water. The liquid effluent was

subjected to analysis for evidence of solubility of the immobilized heavy metals. Negligible amounts of the original thirteen heavy elements were found in the fluid. (Samples of the effluent liquid and the kiln-fired slag are available to any agency desiring further testing.) Thermal immobilization of heavy metals may be accomplished even on such a crude scale. Unfortunately, decomposition of organic compounds can only be tested in the actual reactor.

Community Involvement

Dr. Robert Zwieg, a well-known physician and environmentalist, has provided much leadership to this project. The Clean Fuel Institute, of which Dr. Zwieg is president, is actively involved in developing hydrogen as a fuel for the future, and would, therefore, be interested in purchasing the hydrogen by-product from the coal reactor.

Dr. Frank Rowe, another leading citizen of the Riverside community, is presently working with the ORBS Corp. of Newport Beach to study the feasibility of building the coal reactor from cement. He is also talking to various engineering firms regarding the cost of the above stated feasibility study.

The key leader working on the Stringfellow Acid Pit problems in the Glen Avon community is Penny Newman. She has provided the impetus for a cooperative community approach to solve this major problem.

Collectively, there is a nucleus of community leaders with technical skills and the ability to work with various state, federal and county officials to develop a safe, permanent solution for the Stringfellow Acid Pit.

Samuel D. Huang, Ph.D.
Associate Professor of Biology
Riverside City College

THE GOLD COAL REACTOR*

A UNIVERSAL SOLID-FUELS ENERGY CONVERTER
AN OUTLINE OF ITS USES AND ADVANTAGES

by

PAUL F. WATERS
DIRECTOR OF RESEARCH

BIOPOLIS CORPORATION OF AMERICA
WASHINGTON, D.C.

AUGUST 3, 1982

* The coal reactor was invented by Louis Gold, D.Sc.

OUTLINE

LOUIS GOLD COAL REACTOR

A. THE COAL REACTOR IS A SOLID-FUELS ENERGY CONVERTER

1. It is a new furnace which can burn coal in an environmentally benign manner, with no smokestacks or retrofit cleanup equipment.

2. It can use high-sulfur-content fuels (up to 10% sulfur) without contaminating the environment.

3. It produces no oxides of sulfur or nitrogen. It will not contribute to the problem of the acid rain.

4. The carbon dioxide produced upon complete combustion of the fuel need not be vented directly to the atmosphere. It can be used as a fuel in the coal reactor (CR) when the latter is operated with the guidance of the principles of the theory of coupled chemical reactions. When the CR is operated in this manner:

   a) there is no possibility of inducing thermal inversion in the atmosphere and consequently, no regulation-triggered shut-downs will occur.

   b) there is no exacerbation of the greenhouse effect.

5. No ash is produced in the CR.

6. The CR yields a slag which can be cast into cinder blocks, blown into insulation or crushed into road-bed aggregate.

These reasons, alone, are sufficient to make the CR the device of choice for converting coal to heat for power generation in the electric utility industry, particularly in those regions with plentiful reserves of high-sulfur-content coals.

Moreover, the CR has other advantages:

7. It is a tunable furnace. By means of the theory of coupled chemical reactions it can be operated to produce heat and carbon dioxide or carbon monoxide (with small portions of hydrogen and methane), which can be stored and burned on demand in furnaces designed for use with low BTU gas. It can produce , simultaneously, both heat and carbon monoxide in proportions consistent with the laws of thermodynamics. The CR allows the utility to respond more precisely to load requirements.

8. The CR can use fuels other than coal. Peat, lignite, agricultural wastes, municipal wastes, etc., may be used as fuels, along with sufficient coal when required, to render the reactions self-sustaining.

9. It can produce a gaseous fuel of medium fuel value (ca 400 BTU/ft^3). The CR may be injected with steam and oxygen so as to enrich the fuel gas with hydrogen and methane, with the guidance of the theory of coupled chemical reactions.

B. THE COAL REACTOR IS A CRUCIAL ELEMENT IN THE FORMATION OF AN ECONOMICAL FUELS/CHEMICALS INDUSTRY

Present synfuels processes are not competitive economically. In particular, coal gasification plants:

1) are not designed optimally,
2) are not operated optimally, and
3) inculcate processes which overload the chemistry and energetics of the system by requiring that the basic raw materials be produced in the same vessel.

1. The CR is poised to usher in the hydrogen economy. A method whereby coal is used to drive the regenerable iron/steam reaction in a blast furnace is described in U.S.Patent No. 3,985,320. Such an approach is required in order to produce the massive quantities of hydrogen which will be needed for fertilizers, fuel cells and vehicles if the hydrogen economy is to become a reality. Materials costs are about $\$2/10^6$ BTU.

2. Coupled with the hydrogen generator described immediately above, the CR can produce synthetic chemicals economically. Methanol, e.g., can be made for about 25¢/gal in materials costs.

3. It can provide carbon dioxide for industrial purposes. The method of operating the CR, based on the theory of coupled chemical reactions, encompassing feedback loops designed into the furnace(U.S. Patent No. 4,080,196), can assure the production of carbon dioxide that is relatively free of contaminant gases so that minimal additional processing will produce technical grade gas.

4. The CR can produce limestone. By reacting the carbon dioxide formed in the CR with slaked lime the limestone required for slagging the coal can be made. Any excess can be sold for industrial or agricultural purposes.

5. It can provide carbon monoxide for injection into a blast furnace(U.S. Patent No. 4,316,740) in order to:

   a) conserve metallurgical coke (up to 50%).

   b) produce cleaner metals.

C. THE COAL REACTOR IS THE ULTIMATE DEVICE FOR DESTROYING TOXIC WASTES

1. It can be used to destroy chemical toxic wastes (U.S. Patent No. 4,331,088). The chemical wastes can be introduced with the burden and are destroyed thermally in the closed-system CR. Any residual contaminants(heavy metals, etc.) will be incorporated into and immobilized within the vitreous slag.

2. It can be used to encapsulate solid radioactive wastes. Slag can be formed as the primary product and the molten mass can be delivered to encapsulate the wastes in an exogeneous vessel.

D. THE COAL REACTOR IS THE QUINTESSENTIAL TRASH/GARBAGE DISPOSER

1. The CR converts trash and garbage to a clean fuel gas without environmental pollution, i.e., there is no smoke, no acid oxide formation, no ash, no thermal pollution, no smokestack, and no retrofit pollution-control equipment (U.S. Patent No. 4,078,914).

   The electric utilities can use municipal wastes as a partial fuel or the municipalities may process the refuse in order to generate electricity or distribute fuel gas to factories in industrial parks.

2. It can provide synthetic chemicals.

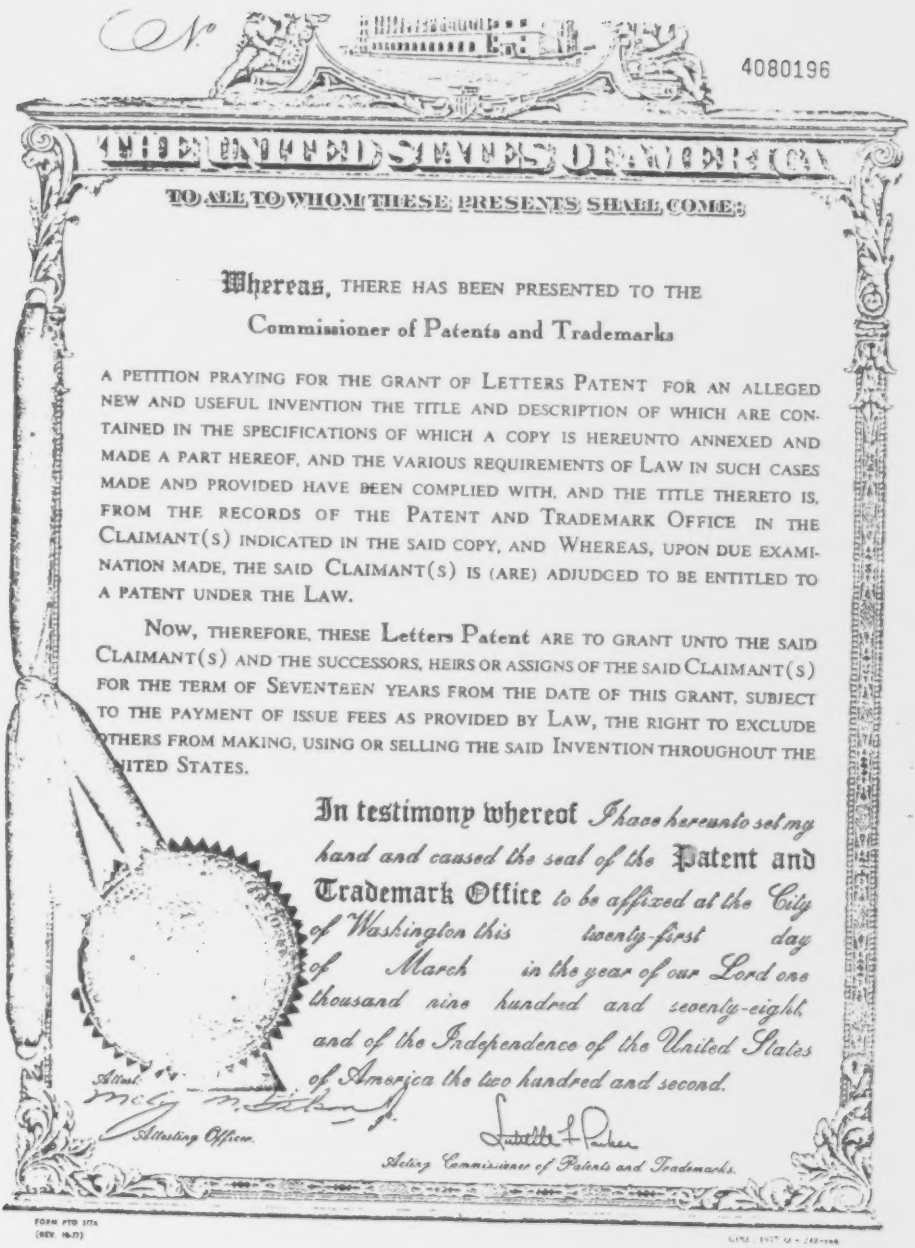
3. It can use high-sulfur-content or caking coals.

4. It obviates the need to set aside valuable acreage for sanitary landfills.

5. By reducing the acreage required for landfills the CR alleviates the danger of contaminating the underground water supply.

6. It can operate in all weather conditions, irrespective of smog or thermal-inversion alerts.

7. It is a net income producer for a municipality.



No. 4080196

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TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas, THERE HAS BEEN PRESENTED TO THE

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A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL INVENTION THE TITLE AND DESCRIPTION OF WHICH ARE CONTAINED IN THE SPECIFICATIONS OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PATENT AND TRADEMARK OFFICE IN THE CLAIMANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID CLAIMANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A PATENT UNDER THE LAW.

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In testimony whereof *I have hereunto set my hand and caused the seal of the* **Patent and Trademark Office** *to be affixed at the City of Washington this twenty-first day of March in the year of our Lord one thousand nine hundred and seventy-eight, and of the Independence of the United States of America the two hundred and second.*

Attest:

Attesting Officer.

Acting Commissioner of Patents and Trademarks.

FORM PTO 377A
(REV. 10-77)

0,196

United States Patent [19]

Gold

[11] 4,080,196

[45] Mar. 21, 1978

[54] METHOD OF OPERATING A VERTICAL SHAFT FURNACE

[76] Inventor: Louis Gold, 2725 39th St., NW., Washington, D.C. 20007

[21] Appl. No.: 686,986

[22] Filed: May 17, 1976

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 602,501, Aug. 5, 1975, abandoned.

[51] Int. Cl.[2] C21B 5/06

[52] U.S. Cl. 75/42; 48/210

[58] Field of Search 75/41, 42; 48/210

[56] References Cited

U.S. PATENT DOCUMENTS

1,924,842	8/1933	Ebner	75/41 UX
2,337,551	12/1943	Hansgirg	75/41
3,630,719	12/1971	Craig	75/41

OTHER PUBLICATIONS

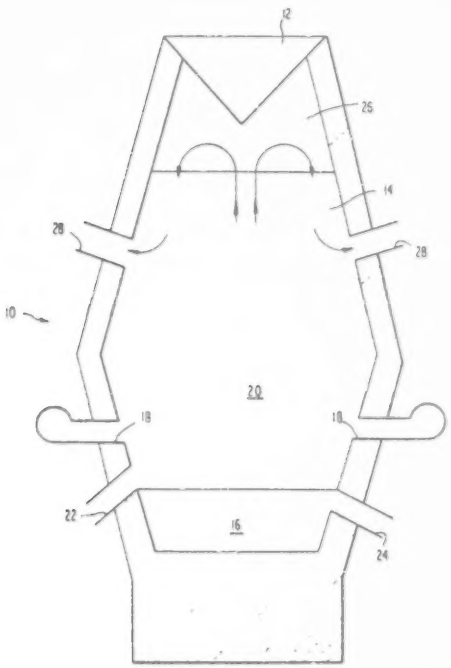
U.S. Steel *Making Shaping & Treating of Steel* 1957, pp. 253–256.

Primary Examiner—M. J. Andrews
Attorney, Agent, or Firm—Sughrue, Rothwell, Mion, Zinn and Macpeak

[57] ABSTRACT

In a vertical shaft furnace such as a blast furnace where the charge is introduced at the top of the furnace to form a burden which moves downwardly through the furnace to the combustion zone adjacent the tuyeres, the top of the furnace is provided with a sealing arrangement to prevent the escape of effluent gases and the exhaust conduits are disposed through the side of the furnace at an intermediate level between the combustion zone and the top of the burden.

2 Claims, 8 Drawing Figures



METHOD OF OPERATING A VERTICAL SHAFT FURNACE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a Continuation-In-Part of application Ser. No. 602,501, filed Aug. 5, 1975 and entitled "Vertical Shaft Furnace" now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is directed to vertical shaft furnaces and more specifically to a top sealed vertical shaft furnace.

2. Prior Art

In conventional vertical shaft furnaces of the type used for smelting ores the top of the furnace is customarily provided with hopper means for introducing the charge into the furnace to form the burden which moves downwardly through the furnace to the combustion zone adjacent a plurality of circumferentially located tuyeres through which an air blast is introduced. The combustion gases rise upwardly through the furnace and collect in the top space between the top of the burden and the hopper means. An exhaust conduit or "downcomer" is provided in this top space for the removal of the gaseous effluents.

An example of such a furnace is the well known blast furnace used for the production of pig iron. The blast furnace is charged with a suitable mixture of coke, limestone and iron ore. The blast furnace process is based upon the counterflow of gases and solids. As carbon monoxide, nitrogen and hydrogen flow upward from the combustion zones, oxygen is acquired from the descending charge. In the reduction of iron ore, a portion of the carbon monoxide is converted to carbon dioxide and similarly a portion of the hydrogen is converted to water vapor. The inert nitrogen from the air used in combustion passes through the furnace with little change. Its concentration is, however, decreased by reactions such as direct reduction and solution loss which increase the volume of carbon monoxide in the gas stream. Similarly, the evolution of carbon dioxide from the limestone also dilutes the nitrogen. All of the gases and vapors produced collect at the top of the furnace and are removed through the "downcomer".

The Ebner U.S. Pat. No. 1,924,842 broadly discloses the idea of locating the outlet conduits immediately below the stock line to prevent the entry of dust or other particulate matter present in the air space above the stock line into the outlet conduits.

SUMMARY OF THE INVENTION

The present invention provides an innovative means to improve the practice of gasification whereby the conventional removal of gases produced in a smelting type furnace, such as the blast furnace, proceeding upwardly through the burden, through the top space and outwardly through the "downcomer" is replaced by a properly arranged conduit at a predetermined level above the tuyeres but below the top of the burden. Thus, the top of the furnace is sealed peripherally and the customary "downcomer" is absent. Suitable sealing means are provided by the feed lock or double bell charging structure at the top of the furnace. The present invention provides for a unique flow of gaseous effluents in a vertical shaft furnace wherein the conventional top gas is forced back downwardly through the burden to the outlet pipes or conduits located at an intermediate level between the top of the burden and the combustion zone. Consequently, pyrolytic products resulting from the thermal decomposition of feed stock together with moisture driven off as steam are made to react with the hot charge. The net result is to suppress the presence of water and tarry matter in the effluent gas to provide a dry clean gaseous product.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic cross-sectional view of a vertical shaft furnace incorporating the present invention therein.

FIG. 2 is a schematic outline showing the relative locations of the various openings and levels within a conventional blast furnace.

FIG. 3 is a schematic outline showing the relative locations of the various openings and levels within a blast furnace according to the present invention.

FIG. 4 is a schematic outline showing the relative locations of the openings and levels in a prior coal reactor construction.

FIG. 5 is a schematic outline showing the relationship of the various openings and levels in a coal reactor as modified according to the present invention.

FIG. 6 is a schematic top plan view of a vertical shaft furnace according to the present invention with the tuyeres and upcomers being of equal number and disposed in vertical alignment.

FIG. 7 is a schematic top plan view of a vertical shaft furnace according to the present invention wherein the tuyeres and upcomers are equal in number but circumferentially offset from each other.

FIG. 8 is a schematic top plan view of a vertical shaft furnace according to the present invention wherein a plurality of equally spaced tuyeres are provided but only a single upcomer is provided.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although the top sealed vertical shaft furnace according to the present invention could vary greatly depending on the specific purpose for which the furnace was designed a blast furnace for the production of pig iron will be discussed by way of example.

The blast furnace 10 as shown in FIG. 1 is provided with the conventional feed means 12 for introducing the charge of coke, limestone and iron ore in predetermined quantities into the furnace. Such a conventional feed means is generally provided with sealing means so that when the feed means is closed the escape of gas through the feed means will be prevented. The material charged into the furnace forms the burden 14 which is supported in the conventional manner on a coke bed 16. A plurality of tuyeres 18 are circumferentially spaced about the circumference of the furnace to provide for the introduction of a hot air blast into the combustion zone generally indicated at 20. As the molten material settles to the bottom of the furnace the slag is removed through the outlet 22 and the molten pig iron is removed through the outlet 24

Since the blast furnace process is based upon the counterflow of gases and solids the gases move upwardly through the burden or charge 14 as the burden moves downwardly through the vertical shaft furnace. In a conventional blast furnace the rising gases collect in the top space 26 and are removed through a conduit or "downcomer" which communicates with this top space 26. However, according to the present invention there are no conduits whatsoever communicating with the top space 26 for the removal of effluent gases. The sole means for removing the effluent gases are comprised of one or more conduits 28 extending through the wall of the furnace at an intermediate level intermediate the top of the burden 14 and the combustion zone 20 at a predetermined location. Thus, the effluent gases which collect in the top space 26 are forced back downwardly through the burden to the exhaust conduits 28 to provide a flow of gases as indicated generally by the arrows in the drawing. Consequently, the pyrolytic products resulting from the thermal decomposition of the feed stock together with the moisture driven off as steam are made to react with the hot charge. The net result is to suppress the presence of water and tarry matter in the effluent gas thereby providing a clean dry gaseous product.

Furthermore, the established downward mode of circulation of the volatiles favors the purging of other impurities as well as mixing with the fluxing agent. To ensure this, the effluent duct needs to be located at a depth below the top of the burden where the temperature ranges above 600° C. An ultimum location for the exhaust pipes can be determined experimentally to provide the optimum results.

The invention has particular value for the gasification of coal and/or refuse in vertical shaft furnaces without the smelting of ores. In vertical shaft furnaces where refuse is incinerated great quantities of water must be removed from the gaseous effluent. The altered flow configuration will force the steam back downwardly through the burden and depending upon the addition of other substances to the refuse such as coal, iron and aluminum the steam will react to generate carbon monoxide and hydrogen. A concomitant action is to eliminate fine dust particles, especially soot via the water-gas reaction.

FIG. 2 shows a relative position of the various openings and levels within a conventional blast furnace represented by the vertical line 30. A feed hopper or double valve 32 is provided at the top of the furnace for introducing the charge into the furnace and the lowest opening in the furnace is the tap hole 34 for removing the molten iron. Conventional blast furnaces are provided with a downcomer or outlet pipe for the blast furnace gases which accumulate in the space above the stock line. As a result of this location of the outlet pipe all of the distillation products such as steam and tarry matter as well as dust and other particulate matter will be entrained in the blast furnace gases.

By locating the upcomer in either or both of the locations noted in the schematic outline of FIG. 3 not only will the dust be eliminated from the blast furnace gases as recognized by the prior art but a substantial change in the chemistry of the blast furnace will take place depending upon the location of the upcomer. By locating the upcomer adjacent the top of the ore reduction zone the gases which accumulate at the top of the furnace above the stock line will be forced back downwardly through the upper portions of the burden in an area identified as the reflux zone. Thus, all of the pyrolytic products in the gases will be either cracked or reformed and the steam will react with the hot coke to provide CO and H_2 to enhance the fuel value of the blast furnace gases. If the upcomer is located at the lower location as indicated in FIG. 3 between the combustion zone and the calcination zone all of the impurities from the pyrolysis of coal will be slagged as they pass downwardly through the calcination zone. Once again, the steam will react with the hot fuel bed and/or coal volatiles to provide additional CO and H_2. Also, since the upcomer in this location would be immediately above the combustion zone the CO from the combustion would be taken off directly before being converted to CO_2 so that the blast furnace gases taken off at this level would have a relatively high percentage of CO. With the reduced amount of CO rising to the furnace the ore reduction is reduced above the calcination zone and a higher percentage of the ore is subjected to direct reduction at a lower level in the furnace. With the upcomer located above the ore reduction zone the reduction of the ore by CO will be increased in the ore reduction zone.

Since the presence of steam and the distillation products are no longer any problem due to the location of the upcomer according to the present invention relatively inexpensive coal can be substituted for the expensive coke. In addition to reducing iron ore the system according to the present invention is also suitable for the reduction of lead and copper ores.

The schematic arrangement of the openings and levels within a coal reactor of the type disclosed in applicant's co-pending application Ser. No. 572,769, filed Apr. 29, 1975 is set forth in FIG. 4. As with the conventional blast furnace, the coal reactor is provided with a downcomer communicating with the space between the stock line and the hopper 42 of the vertical shaft indicated by the line 40. Since no ore is present in the coal reactor only a single tap hole 44 is provided at the bottom for the removal of slag. According to the present invention an upcomer can be located beneath the stock line substantially at the boundary between the calcination zone and the reflux zone, the latter being defined as the portion of the burden between the stock line and the upcomer. The upcomer can also be located at a lower level than the furnace between the combustion zone and calcination zones. As with the blast furnace furnace operation described above the distillation products from the coal as well as the steam which accumulate in the space above the stock line will be forced back downwardly through the reflux zone. The steam will be converted to CO and H_2 while the pyrolytic products will be either cracked or reformed. The burden will go through a purification process as it passes downwardly through the vertical shaft furnace before reaching the combustion zone. With the upcomer located above the calcination zone the furnace gases taken off through the upcomer will include a small amount of CO_2 resulting from the decomposition of the limestone flux. With the upcomer located between the calcination zone and the combustion zone the impurities from the pyrolysis of coal will be slagged on passage through the calcination zone. Some CO from the combustion zone will be taken off directly through the upcomer at this lower location. Thus, according to the present invention the composition of the gases can be varied by varying the location of the upcomer at different levels of the furnace below

U.S. Patent March 21, 1978 Sheet 1 of 3 4,080,196

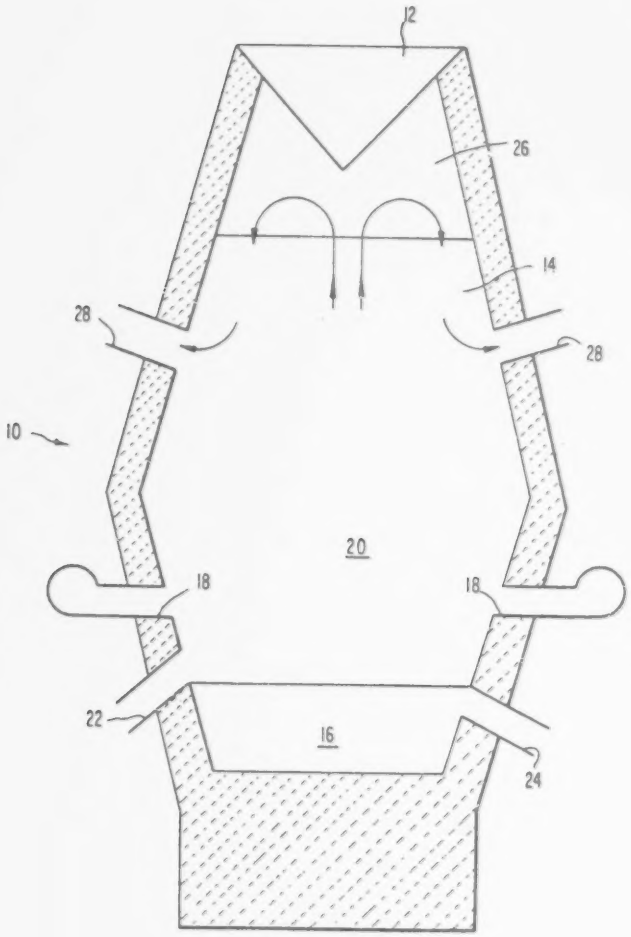


FIG. 1

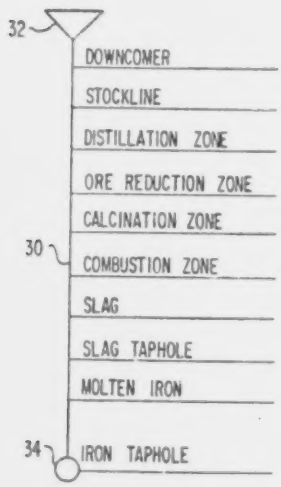


FIG 2 PRIOR ART

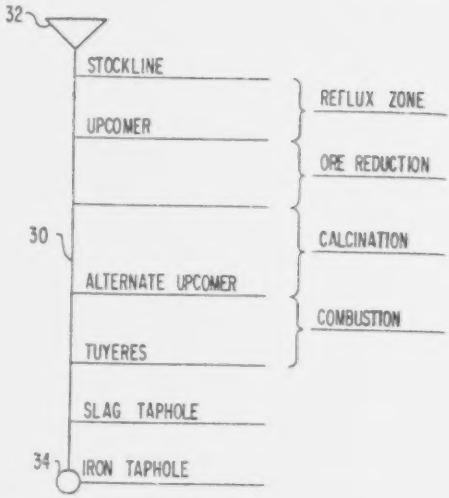


FIG 3

FIG 4
PRIOR ART

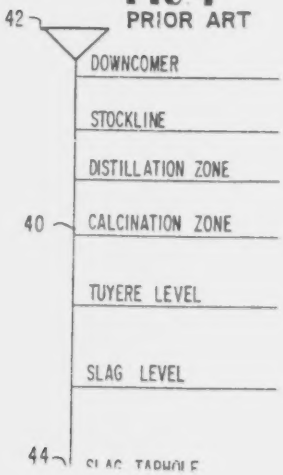
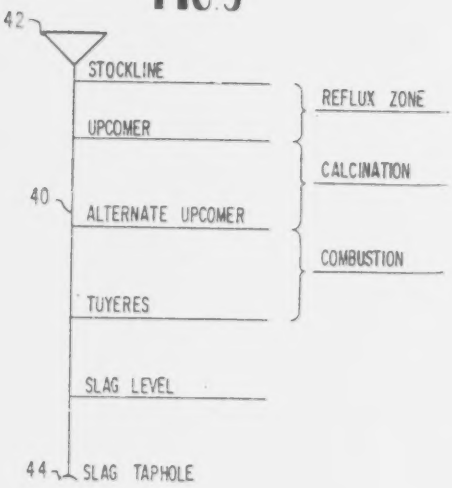


FIG 5



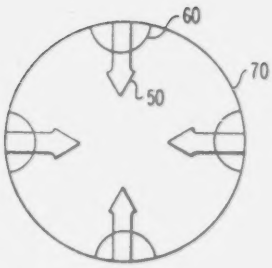


FIG 6

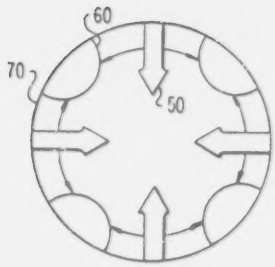
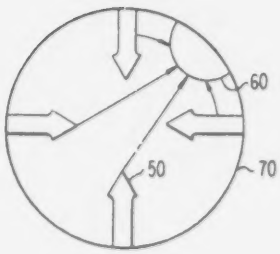


FIG 7

FIG 8



No. 4331088

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In testimony whereof *I have hereunto set my hand and caused the seal of the* **Patent and Trademark Office** *to be affixed at the City of Washington this twenty-fifth day of May in the year of our Lord one thousand nine hundred and eighty-two, and of the Independence of the United States of America the two hundred and sixth.*

Attest:

Attesting Officer.

Commissioner of Patents and Trademarks

FORM PTO 37A
(REV. 10-77)

United States Patent [19]

Gold

[11] 4,331,088

[45] May 25, 1982

[54] MANAGEMENT OF CHEMICAL TOXIC WASTES

[76] Inventor: Louis Gold, 2745 29th St., NW., Washington, D.C. 20008

[21] Appl. No.: 30,991

[22] Filed: Apr. 19, 1979

[51] Int. Cl.³ F23G 7/00

[52] U.S. Cl. 110/346; 110/237; 110/259

[58] Field of Search ..... 110/237, 346, 259; 252/301.1 W; 75/42

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Primary Examiner—Edward G. Favors

[57] ABSTRACT

Two regimes of vertical shaft furnace operation can be employed to slag encapsulate hazardous chemical wastes. One of these is similar to a method applicable to radioactive wastes, involving the pouring of hot molten slag from a Coal Reactor over the hazardous matter contained in a suitable designed crucible. The other method is especially appropriate for the treatment of chemical wastes that have become mixed with a great deal of soil or other diluent as must be handled as in the case of the Love Canal incident. It consists of feeding the contaminated solid mass into the Coal Reactor with a predetermined amount of coal and limestone that will still admit an adequate heat balance to generate a carefully tailored slag to incorporate the reacted waste feedstock.

3 Claims, No Drawings

MANAGEMENT OF CHEMICAL TOXIC WASTES

BACKGROUND TO THE INVENTION

Conventional methods for dealing with such chemical toxic wastes as represented by the Love Canal crisis have been rejected as inadequate. Many similar disastrous discoveries have added to the immensity of the problem with the prospects of costs that are astronomical. The foundations of a practical solution were indeed discussed with the City of Niagra Falls in Aug. 1978, followed by a confidential disclosure more recently.

The Coal Reactor version of a vertical shaft furnace is envisioned as the best approach to the detoxification of hazardous chemical wastes, offering on site operation to minimize handling and transportation. In this fashion a clean, inexpensive energy source resulting from the burning of coal can give rise to an adequate thermal reservoir and slag volume for the treatment of such wastes, taking full advantage of a new type of utility station awaiting development. The symbiotic operation inherent in the innovative response to the health dangers posed by chemical toxic residues from industrial plants virtually insures successful resolution of an increasingly growing environmental menace for which there may be no other realistic solution.

SUMMARY OF THE INVENTION

Coal Reactor power stations of the future for the production of an abundance of clean energy can be adapted to remove toxic chemical wastes from the environment in offering a molten slag output that will encapsulate the pyrolyzed decomposition products from the high temperature exposure. The limestone, normally required to purge the impurities from even the poorest grades of coal and regulated additions of garbage, forms the basis of a slag (a mixture of oxides of calcium, magnesium, aluminium, silicon, etc.) that can react with the decomposed residues of the toxic wastes. Continuous operation is possible by feeding the dangerous wastes together with the lime and coal with possibly some municipal wastes allotments into the vertical shaft furnace to wind up with a slag that can be safely handled and disposed of keeping costs at a reasonable level. An alternative batch process entails pouring a suitably tailored slag over the contaminated mass placed inside a crucible whereupon, following a prolonged coating period, the decomposed residue is sealed into the solidified mass resulting.

DETAILED DESCRIPTION OF THE INVENTION

The extent and chemical composition of the toxic waste matter to be treated provide vital information as to the scale of operation and the power level of the Coal Reactor needed to insure an adequate heat balance with an energy output to make the installation self-contained. Having decided on the throughput capacity, the amount of coal and limestone needed can be estimated and the size of the coal Reactor prescribed. Since tons of material may be generally expected on a daily basis, the power output of the station will fall well into the multi-megawatt range.

In the mode chosen for the treatment of the hazardous wastes involves the direct addition to the feedstock of limestone and coal at the top of the vertical shaft furnace, the danger of the toxic decomposition products escaping with the normal gaseous effluent of the Coal Reactor can be guarded against by invoking the reflux arrangement (described in U.S. Pat. No. 4,080,196). The so-called upcomer conduit for the escaping gases should be placed below the calcination zone of the reactor vessel.

The other manner of encapsulation by the slag addition to the toxic material resting at the bottom of the crucible may need to be accompanied by chemical additives to render the decomposition products from the high temperature exposure harmless. Thus, the use of a lime covering over the toxic charge may prove desirable. The effectiveness of whatever chemistry is selected to tie up toxic vapors produced by the pouring of the hot molten slag into the charged crucible will need evaluation by samplings of the resultant encapsulated products.

The latter mode of treatment requires a sufficiently long interval to permit mixing of the slag with the waste material and its decomposition products, a condition favored by employing large enough batches to slow down the cooling and the ensuing solidification. The crucible geometry also poses an important factor in this regard since the surface to volume ration plays an important role in the rate of cooling.

So for both modes of thermal destruction of toxic wastes a squat-cylindrically shaped crucible is to be preferred for closer control of the solidification in allowing ample time for degassing and the formation of sound castings that are relatively stress free. The porosity of the solidified mass represents another important consideration in minimizing leaching during the course of storage. The reduced surface to volume ratio will support the objective of curbing the overall weathering of the encapsulation product in reinforcing the effect of low porosity itself.

Indeed, ultrasonic diagnostics is advised to detect any flaws in the final product, a procedure that should help guide determination of the conditions necessary for satisfactory results. Other diagnostic tools may be invoked such as x-ray and chemical analysis to arrive at an understanding of the fate of the hazardous chemical wastes when subjected to the thermal destruction treatment. By such means the engineering specifications for a wholly new technology can be expected to evolve.

What is claimed is:

1. A method of chemical toxic wastes management by thermal decomposition using a coal reactor as the heat source and slag producer for purging and encapsulation comprising the steps:

(a) Feeding said toxic wastes via a seal at the top of the coal reactor together with adjusted input of coal and limestone to effect direct thermal decomposition and purging of the decomposition products and wherein said wastes, coal, and limestone form a stockline located above a combustion zone,

(b) controlling the flow of the resultant gaseous effluent by establishing a reflux mode forcing the said effluent to exit the coal reactor via an upcomer conduit located intermediate the stockline and the combustion zone to maintain complete removal of toxic pollutants,

(c) Encapsulating the residual solid toxic pollutants with the highly reactive hot slag, the encapsulated product then removed at the bottom of the coal reactor in sufficiently large batches to allow gradual cooling in a crucible designed to slow solidification conducive for yielding sound castings.

2. A method of claim 1 wherein the feed is mixed with municipal garbage to enhance the fuel valve of the effluent.

3. A method of detoxifying chemical wastes comprising the steps:

(a) generating a hot motten slag in a coal reactor,

(b) feeding said wastes into a crucible located outside of the coal reactor,

(c) tapping said slag into the crucible and encapsulating said wastes, said crucible designed to prelong the thermal decomposition period and allow gradual cooling of the resultant encapsulated product.

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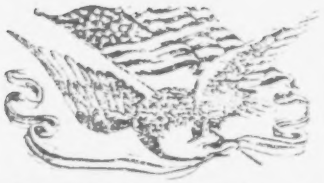

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IN TESTIMONY WHEREOF *I have hereunto set my hand and caused the seal of the* PATENT AND TRADEMARK OFFICE *to be affixed at the City of Washington this twelfth day of October in the year of our Lord one thousand nine hundred and seventy-six, and of the Independence of the United States of America the two hundredth and first.*

Attest

Secretary of Commerce

Washington, D.C.

Commissioner of Patents and Trademarks

United States Patent [19]

Gold

[11] **3,985,520**

[45] **Oct. 12, 1976**

[54] **GASIFICATION PROCESS AND APPARATUS**

[76] Inventor: **Louis Gold**, 2725 - 39th St., Northwest, Washington, D.C. 20007

[22] Filed: **June 26, 1975**

[21] Appl. No.: **590,743**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 355,400, April 30, 1973, abandoned.

[52] **U.S. Cl.** **48/202**; 48/210; 48/101; 75/41

[51] **Int. Cl.²** **C10J 3/00**; C10J 3/16

[58] **Field of Search** 48/210, 209, 197, 101, 48/202; 75/41, 42

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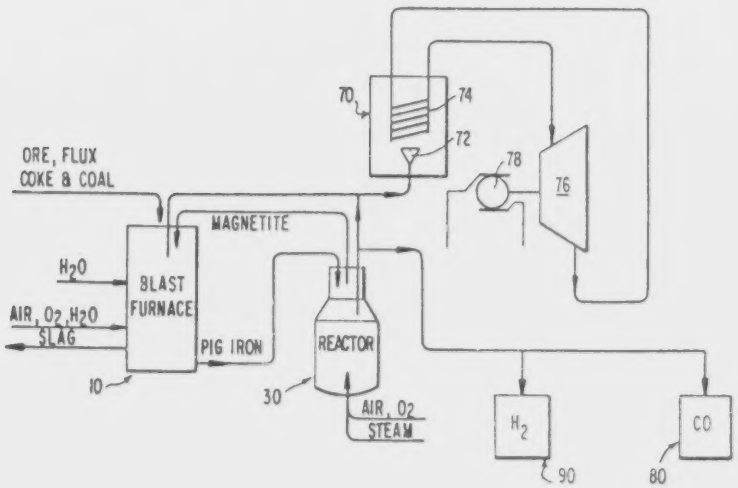
Primary Examiner—R.E. Serwin

Attorney, Agent, or Firm—Sughrue, Rothwell, Mion, Zinn and Macpeak

[57] **ABSTRACT**

In addition to introducing steam and/or oxygen in the heated airblast through the tuyeres of a conventional blast furnace to provide a blast furnace gas enriched with carbon monoxide and hydrogen, air and/or steam can be forced through the molten pig iron which has been withdrawn from the blast furnace into a separate reactor having a modified construction similar to the basic oxygen furnace for the purpose of producing large volumes of hydrogen. The blast furnace gasses can be combined with the gasses from the reactor to provide a clean burning fuel for use in power plants and the like or the hydrogen from the reactor can be utilized directly in fuel-cell technology. The resulting iron oxides (magnetite, etc.) which result from the pig iron-steam reaction can then be recycled through the blast furnace.

10 Claims, 4 Drawing Figures



U.S. Patent Oct 12, 1976 3,985,520

FIG 1

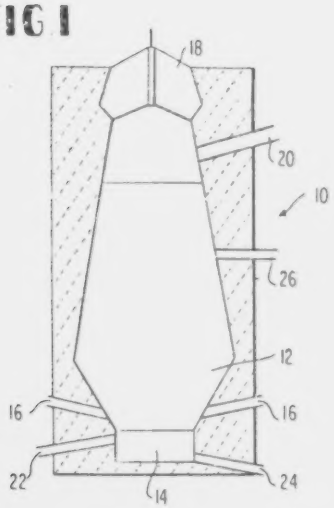


FIG 2

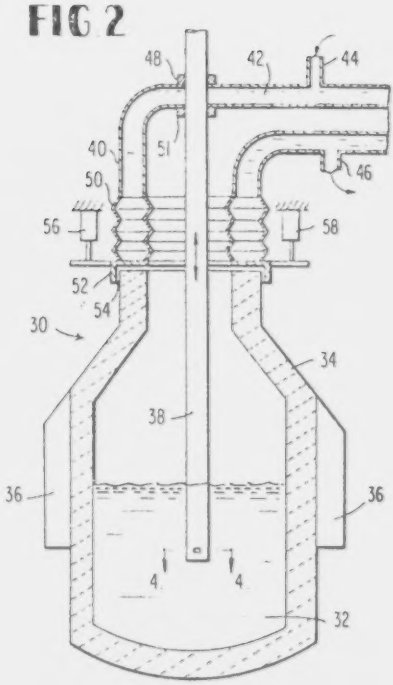


FIG 4

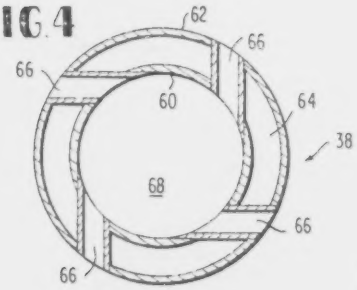
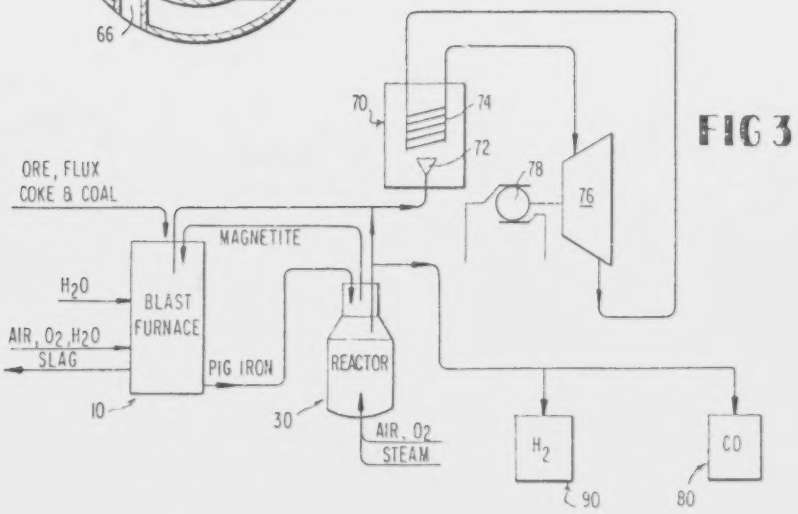


FIG 3



GASIFICATION PROCESS AND APPARATUS

REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 355,400 filed Apr. 30, 1973, entitled "Clean Energy Sources From Efficient Conversion of Coal and Related Fossil Fuels: Controlled Emissions and Electric Power Generation and Gasification Processes", now abandoned.

BACKGROUND OF THE INVENTION

The growth of the coal industry has been arrested in part by the expectancy that nuclear fuels would prove to be cleaner and much more economical. This circumstance has failed to materialize, with nuclear power today furnishing only a mere fraction of the energy derived from coal. However, the critical demand for escalating levels of power is presently confronted with strenuous environmental objections to the liquid metal fast breeder reactor believed to be the answer to the energy impasse while the burning of coal by the electric utility companies remains stymied in the face of stringent emission codes imposed.

To further exacerbate the grim energy outlook, the exhaustion of the much more limited reserves of oil and natural gas is threatened. Against this background, coal looms as the only realistic way out of a most frustrating position if only it could be burned without attendant pollution hazards and/or practical gasification-liquification actually achieved. In brief, the vast stores of coal could insure a reasonable abundance of energy for centuries to allow sufficient time for the advent of revolutionary developments such as the controlled release of thermonuclear energy, perhaps in the form of laser-induced fusion.

Emergency measures have been taken to exert an effort to find ways of purging coal of its objectionable impurities, largely sulfur and the ash residue. In this age of intense overspecialization, it is not entirely strange that virtually an entire realm of well-established technology that had already addressed itself rather successfully to this problem in a different context has been overlooked.

The Iron and Steel Industry, over the course of many years, came to grips with the challenge of producing high quality ferrous metals and alloys, not least of which was the control of impurities. The blast furnace represents a remarkable means to manufacture voluminous amounts of raw pig iron relatively uncontaminated by a host of foreign substances contained in ore, limestone and coke, constituting the starting materials. The smelting process performed in the blast furnace restrains the entry of undesired impurities into the molten pig iron; the chemistry is tailored to purge such components as sulfur and ash as they are taken up principally by the slag. Subsequent refinement of the pig iron gives rise to high quality steel products.

The practical economics of blast furnace operations spurred the refinement of the gaseous byproducts for the recovery of fine particulates (dust) to be recycled and the manufacture of a clean gaseous fuel for heating of the air blast and for power generation for diverse ancillary purposes not least of which is the driving of compressors.

Viewed from such a vantage point, the clean use of coal has a tradition to turn to but with the provision to institute meaningful changes where prudent. Thus, the present invention, while based upon blast furnace technology, embodies several innovations which will help the coal industry which has tended to stagnate over recent years.

It is well known in the blast furnace art to introduce oxygen and/or steam with the air blast or as a substitute for the air blast to provide an enriched blast furnace gas. If the steam is introduced at the lower tuyere level water gas will be produced as a result of the standard steam-coke reaction. If steam is introduced in the upper levels of the furnace it will react with the nascent iron to produce H_2.

It is also well known in the steel making art to blow oxygen through molten pig iron in the basic oxygen furnace to remove the carbon from the pig iron.

SUMMARY OF THE INVENTION

The present invention provides a new and improved process for the production of a high caloric fuel gas involving the clean combustion of ore and limestone consonant with the formation of pig iron and a liquid slag into which the impurities, largely sulfur and ash, can pass.

The present invention provides for the production of large volumes of hydrogen by the passage of steam through molten pig iron in a reactor separate from the blast furance with the resulting iron oxides being recycled through the blast furnace with the addition of suitable amounts of coal/coke and limestone to once again reduce the iron oxides to molten pig iron. Scrap iron may be added to the reactor to reduce the cost.

The present invention provides for the production of conventional blast furnace gases comprised mostly of carbon monoxide, carbon dioxide and nitrogen which can be mixed with hydrogen generated from the steam treatment of the molten pig iron in a separate reactor for a valuable caloric fuel or for subjection to catalytic methanation.

The present invention also provides for the introduction of an oxygen blast through the molten pig iron in the reactor prior to the introduction of steam to burn off the carbon. The resulting CO can be collected and portions of the refined pig iron can be withdrawn prior to the introduction of steam and used in the manufacture of steel products.

The present invention also provides for the introduction of steam with the air blast or through separate tuyeres in the blast furnace for the production of hydrogen to enrich the blast furnace gas. It is also contemplated to use oxygen or oxygen-enriched air for the air blast in the blast furnace to further enrich the blast furnace gas with CO. However, the CO and H_2 will be diluted by the large volume of N_2 in the blast.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the blast furnace according to the present invention.

FIG. 2 is a schematic view of the reactor for forcing steam through the pig iron according to the present invention.

FIG. 3 is a flow diagram for the process according to the present invention.

FIG. 4 is a detailed view of a blow lance showing the tangential nozzle arrangement.

DETAILED DESCRIPTION OF THE INVENTION

This invention relates to the conversion of coal and other fossil fuels into environmentally "clean" fuels, that is, fuels which can be burned without the production of sulfurous oxides or other undesirable atmospheric contaminants.

More particularly, the present invention is addressed to suitable modification of the blast furnace whereby it can accommodate as part of its charge, large amounts of high sulfur coal while producing an environmentally clean gaseous fuel which could be used as a substitute for natural gas. The enrichment and augmentation of the gas produced in the blast furnace is achieved by the introduction of steam at predetermined levels of the blast furnace as well as the steam treatment of the molten pig iron in a separate reactor vessel. If the steam is introduced in the upper levels of the furnace it will react with the nascent iron to produce H_2.

The injection of steam into the blast furnace can result in an increase of CO and H_2 in the product gas. The introduction of steam can be effected at more than a single location, for example, in the air blast through the tuyeres, as well as at higher levels of the furnace where the reaction of steam with newly formed sponge iron radically alters the composition and amount of stack gas produced. Further increase in the production of gas from the furnace can be effected by the introduction of steam into the molten pig iron preferably in combination with air or oxygen with suitable means for recovering the resulting gasses. The iron oxides formed by the oxidation of pig iron can be recycled to the blast furnace thereby decreasing the requirement for raw iron ore. Scrap iron in predetermined quantities can be added to the blast furnace.

It will be appreciated that by operating the blast furnace in the manner described important environmental advantages ensue because the ash and sulfur are both captured in the furnace slag and the blast furnace gas is sufficiently sulfur free to meet environmental standards as a clean fuel. The blast furnace gas may be additionally enriched in hydrogen.

FIG. 1 of the drawing shows a schematic view of a conventional blast furnace 10 provided with a bosh 12, a hearth 14, tuyeres 16, a double bill arrangement 18 for introducing the charge, a gas withdrawal line 20, a slag hole 22 for withdrawing liquid slag and a metal hole 24 for withdrawing molten pig iron all in a manner known per se. As indicated previously, the hot air blast which is introduced through the tuyeres can also be substituted by oxygen or air enriched with oxygen and/or steam to cause an enrichment of the blast furnace gas withdrawn through the outlet 20 with carbon monoxide and hydrogen. If it is desired to increase the H_2:CO ratio of the gas at the synthesis level steam maybe introduced in line 26 approximately at the 1,000° F level.

The pig iron reactor 30 shown in FIG. 2 is constructed similar to the basic oxygen furnace and is adapted to be filled with a charge of molten pig iron in the conventional manner. The vessel 34 is provided with trunions 36 which allow the vessel to be pivoted for receiving the molten pig iron and for discharging iron oxides after the oxidation to a predetermined extent. A lance 38 similar to the oxygen lance in the basic oxygen furnace is adapted to be inserted and retracted from the molten pig iron in the conventional manner. However, as opposed to the basic oxygen furnace the reactor according to the present invention is provided with an outlet conduit 40 for collecting the gasses produced in th vessel 34. Due to the hot nature of the effluent gasses collected by the conduit 40 the conduit should be a doubled-walled conduit providing with a water jacket 42 through which water may be circulated from an inlet 44 to an outlet 46. Suitable seals 48 and 50 are provided in the wall of the conduit 40 to allow for the sliding movement of the lance 38. In order to collect all of the top of the vessel 34 and in order to accomplish this, a flexible metal bellows 50 is provided at the end of the pipe. Secured to the end of the bellows 50 is a flange member 52 having suitable heat resistant sealing material 54 attached thereto, which is adapted to fit over the top edge of the vessel 34 in tight sealing engagement. In order to move the flange 52 and seal 54 into sealing engagement with the lip of the vessel 34, a pair of hydraulic cylinders 56 and 58 or any other suitable actuating means may be provided. In order to charge and discharge the vessel 34, it will be necessary to retract the sealing flange 52 to allow for tilting of the vessel 34.

The detailed construction of the lance 38 is best shown in FIG. 4 which is a sectional view taken along the line 4—4 on FIG. 2. The lance 38 is provided with an inner wall 60 and an outer wall 62 defining a hollow passage 64 through which a coolant such as water or the like may be circulated. A plurality of apertures 66 extend through the walls from the central passage 68. The apertures 66 are substantially tangential to the inner wall 60 so that the flow of gasses from the end of the lance into the hot molten pig iron will create a swirling effect. By creating a swirling motion within the molten pig iron, the reaction taking place is greatly enhanced. It is contemplated that initially a blast consisting partly or exclusively of oxygen could be directed through the flange into the molten pig iron to burn off the carbon and raise the melt temperature for a slower subsequent steam blow. The carbon monoxide which results from a burning off of the carbon is initially diverted to a storage facility through the pipe 40, thereby serving to flush out all of the air from the upper portion of the reaction vessel 34 and the pipe 40 before introducing steam through the lance for the production of hydrogen.

The introduction of steam and O_2 simultaneously will catalytically react with Fe and FeO_x to convert the CO and H_2 to methane (CH_4).

The introduction of an air blast through the lance would initially generate a bosh-type composition gaseous fuel comprised of 35% carbon monoxide and 65% nitrogen. Oxygen enriched air clearly would mean an increased fuel value, but this would not be the prime reason for introducing oxygen. The cost of the latter could be more than compensated for in terms of the advantage of suppressing heat loss from the molten pig iron in the reactor. Replacing the air blast with oxygen clearly would lead to intensified heating without the cooling effect of the nitrogen otherwise present.

Hence, the refinement period can be further extended and by producing very large volumes of molten pig iron and by controlling the surface to volume condition carefully a greatly increased production of hydrogen can be expected.

The overall gasification and power generation system envisioned by the present invention is shown schemati-

cally in FIG. 3. As mentioned previously, the blast furnace is charged with iron ore, some scrap iron, a fluxing agent such as limestone, coke and coal without regard to the sulfur content of the coal. The blast furnace is provided with a conventional tuyere system to provide a hot blast of air to the combustion zone. In addition to the air blast, oxygen and steam may also be introduced through the tuyeres to provide for increased amounts of carbon monoxide and hydrogen in the blast furnace gas. Additional steam may be introduced into the blast furnace at the synthesis level to provide for an increased production of hydrogen in the blast furnace gas. As shown in the schematic of FIG. 3, the blast furnace gas is directed to a heat exchanger **70** and after passing through a conventional scrubber/electrostatic precipitator arrangement (not shown) to remove dust particles from the gas, the gas can be used directly as a clean burning fuel for the burner **72**. The steam generated in the heating coil **74** is directed to a turbine **76** which in turn drives a generator **78** for the production of electric power.

The pig iron which is taken off from the bottom of the blast furnace is transported by conventional means and poured into the reactor **30**. As previously indicated, the reactor vessel **34** is tilted to allow for the introduction of the molten pig iron and is subsequently raised to the vertical position prior to the blowing of gasses therethrough. Flange **52** of the conduit **40** is moved into tight sealing engagement with the lip of the reactor vessel **34** and initially and/or oxygen are introduced into the molten pig iron through the lance **38** for the generation of carbon monoxide. By a suitable valving arrangement on the conduit **40** the carbon monoxide can be directed to a storage tank **80** and in the process the conduit will be purged of air prior to the introduction of steam to the lance **38**. The subsequent blast of steam through the molten pig iron reacts with the iron to release hydrogen and form iron oxides (magnatite, etc.). The hydrogen can be mixed with the blast furnace gas to enrich the same for power generation purposes or be directed to a hydrogen storage tank **90** for future use in fuel cell technology or other technologies requiring large volumes of hydrogen. It is also contemplated that the blast furnace gas enriched by the hydrogen from the reactor could provide a suitable synthesis gas of pipeline quality for distribution commecially. The steam iron reaction is carried out in the reactor to approximately 90% completion thereby still maintaining a liquidus, somewhat slushy mixture which is still capable of being readily removed from the reactor upon tilting of the same. The entire charge is then recycled back through the blast furnace for subsequent reduction and regeneration of molten pig iron.

Instead of using a reactor such as illustrated in FIG. 2 which is similar to the basic oxygen furnace, it is also contemplated to use a reactor identical to the standard Bessemer converter wherein the blast is introduced through bottom apertures in the vessel. With the Bessemer-type converter in the tilted position, a charge of molten pig iron is introduced therein up to the level of the apertures. A blast of air and/or oxygen is introduced through the apertures and the converter is tilted to the upright position so that the blast will be forced upwardly through the molten pig iron. As soon as the converter reaches the upright vertical position a conduit having a movable bellows-type end similar to that shown in FIG. 2 is moved into sealing engagement with the top of the converter to collect the gasses. After a [illegible] time the blast could be switched exclu-

1400° C in the reactor which has a diameter of 10 feet to provide an approximate volume of 10^2 cubic feet. The vessel has an approximate 100 tone capacity which is approximately equal to 10^5 kg. which in turn is equal to 10^8 gms. and the volume approximates 10^7 cc or 10^4 liters. It is contemplated that 10 runs of the reactor could be accomplished daily with each unit lasting approximately one hour. The amount of steam required involves approximately 100 tons of water which amounts to about 10^4 gallons per blow or approximately 10^5 gallons per day. Thus, each blow would produce approximately 10^2 cubic feet of hydrogen for a daily output of 10^5 kg. of hydrogen.

Therefore, if a blow period lasted for approximately one hour, or say 1,000 seconds, the flow rate for steam would be approximately 10^4 cubic feet per second. This is a very high rate which must be spread over a large area for reasonable steam flux. If the conduit has a cross-section of approximately 100 square feet, a flow rate of approximately 100 per second per foot^2 would be achieved. A surge storage tank would be needed for the hydrogen released during a blow operation and the customary safeguards for the handling of large quantities of hydrogen would be required.

What is claimed is:

1. A process for the production of hydrogen comprising producing a quantity of molten pig iron in a blast furnace, charging said molten pig iron into a separate reaction vessel, passing steam through the molten pig iron in said reactor to produce iron oxides and hydrogen, collecting said hydrogen and recycling said iron oxides through said blast furnace.

2. A process as set forth in claim **1** wherein the reaction of said steam and molten pig iron takes place in a closed environment.

3. A process as set forth in claim **1** further comprising passing steam through the charge in said blast furnace to provide a hydrogen enriched blast furnace gas.

4. A process as set forth in claim **1** further comprising passing oxygen through the charge in said blast furnace to provide a carbon monoxide enriched blast furnace gas.

5. A process as set forth in claim **3** wherein the hydrogen produced in said reactor is added to said blast furnace gas to enrich the same.

6. A process as set forth in claim **4** wherein the hydrogen produced in said reactor is added to said blast furnace gas to enrich the same.

7. A reactor for the production of gasses from molten pig iron comprising a vessel having an open top adapted to receive a charge of molten pig iron, means for pivoting said vessel from a tilted position for assisting in charging and discharging the molten material to a substantially vertical position, blast means for introducing a gaseous blast through the molten pig iron and conduit means having movable sealing means at one end adapted to be moved into tight sealing engagement with the top of said vessel to provide for the collection of all gasses emanating therefrom.

8. A reactor as set forth in claim **7** wherein said blast means are provided for in said conduit means.

9. A reactor as set forth in claim **7** wherein said blast means is comprised of a lance adapted to be extended into and withdrawn from the vessel through the top thereof.

10. A reactor as set forth in claim **7** wherein said blast means is comprised of a plurality of apertures in the bottom of said vessel and additional conduit means

20 May 1982

Tom Bailey
Acting Chief
Site Cleanup and Emergency Response Section
Hazardous Waste Management Branch
Department of Health Services
714 P St.
Sacramento, CA 95814

Citizens for a Better Environment

RE: Stringfellow Quarry Hazardous Waste Disposal Site

Dear Mr. Bailey:

Citizens for a Better Environment (CBE) has reviewed a number of technical documents, research reports, and agency summaries related to conditions at the Stringfellow site and the status of the interim abatement program. These materials were prepared by James M. Montgomery Consulting Engineers, Inc., Woodward-Clyde Consultants, Department of Health Services, and the Santa Ana Regional Water Quality Control Board.

We understand from a phone conversation with Mr. Elgar Stephens of the Department of Health Services that you are soliciting comments on the interim abatement and site closure program at the Stringfellow site. This is preliminary to requesting CERCLA (Superfund) funds and negotiating a cooperative agreement with the U.S. Environmental Protection Agency (EPA).

CBE is seriously concerned that the interim abatement program will not provide for long-term on-site containment of hazardous waste materials and leachate at the Stringfellow site. This concern is based on technical factors discussed below. In addition, CBE believes that the selection of the present abatement program as the most cost-effective site closure alternative was a premature and short-sighted decision. This selection did not consider long-term cleanup and abatement costs that may be associated with eventual containment failure. The "in perpetuity" operation and maintenance costs for this alternative were incorrectly deemed to be equal to those for other alternatives.

The concern that on-site containment will ultimately be ineffective is based on questions surrounding three issues:

- the efficacy of the gel seal cut-off/grout curtain in preventing off-site migration of hazardous waste leachate;
- the efficacy of downgradient groundwater extraction in containing and removing the contaminated groundwater plume;
- the efficacy of waste neutralization in rendering on-site hazardous wastes insoluble.

Waste Neutralization

The consulting engineers estimate that 75% of the acidic wastes at the Stringfellow site have been neutralized, thus rendering heavy metal contaminants

Tom Bailey

20 May 1982

citizens FOR A BETTER ENVIRONMENT

insoluble. This number represents an optimistic guess at best. Even if 75% of the wastes were rendered insoluble, thus non-leachable, about 125,000 cubic yards of contaminated soil and acidic wastes would remain in a form that would contribute to hazardous waste leachate generation.

Other factors which will hinder success of the neutralization program:

- There is continuous subsurface inflow of groundwater to the site which remains to be fully defined in magnitude. This guarantees continuous leachate generation for an indefinite period of time.

- Long-term maintenance of exposed clay caps is a questionable proposition, especially during our [illegible] winter rains. Eventual surface infiltration is likely and will contribute to further leachate generation.

Gel Barrier

The Stringfellow site overlies extensively fractured bedrock, as noted in several technical reports. The extent and depth of these fractures have not been well defined. In fact, until recently, several important aspects of the site geology had been grossly misunderstood.

It's unlikely that the gel sealant will provide total containment of hazardous leachate. Dr. D.J. Stierman of U.C. Riverside concluded that "grouting alone will not isolate these fluids" (August 16, 1980, Public Comment). Even the Santa Ana Regional Water Quality Control Board expresses doubts in noting that because of extensive fracturing, monitoring wells downstream of these areas will be necessary to determine the effectiveness of the gel barrier in the future (Report No. 15, 4/82).

Groundwater Extraction

The last line of defense in preventing further off-site contamination is downstream extraction wells for removal of contaminated groundwater. Extraction wells will also be in place on-site to remove hazardous waste leachate.

It is unlikely that these wells will provide total containment or removal of subsurface contaminants. Dr. Stierman estimated that "simple pumping will extract at most 40-50% of the fluids in these rocks." Given the incomplete understanding of groundwater movement in the area, there can be no guarantee that downstream movement of the [illegible] contaminants will be completely halted.

In addition, the continuous generation of hazardous leachate due to subsurface infiltration of the site (plus the potential for failure of the clay cap) means that operation and maintenance of the extraction wells must continue ad infinitum.

Tom Bailey

20 May 1982

citizens for a better environment

Recommendations

Clearly, the present abatement program, although a vast improvement over past site conditions, represents but an interim solution. The ultimate site closure objective should be total removal of hazardous waste materials to a geologically secure disposal site, as was originally committed to by the State.

How can this be accomplished given the limited resources available for further abatement? First, have all attempts at assigning liability and recovering costs from responsible parties been exhausted? Can't an innovative and aggressive scheme for recovery of funds from those companies which disposed of hazardous wastes at Stringfellow be devised? Are other theories of liability applicable?

Second, regarding CERCLA/Superfund funds: it is the opinion of a number of people that EPA headquarters is not anxious to commit extensive funds to any one particular hazardous waste site (criticism of Superfund implementation extends beyond this point, of course). With this bare-bones, "cost-effective" approach, you get what you pay for: interim (i.e., temporary) abatement.

Indications are that the EPA's mind is already made up regarding disbursement of Superfund monies for the Stringfellow site. In spite of the EPA's mindset, the State Department of Health Services should be requesting, and aggressively advocating , receipt of as much Superfund money as possible, or even more than it believes is possible. The EPA off in Washington doesn't have nearly the degree of commitment to the health and welfare of the citizens of California that the State of California does. It behooves the Department of Health Services to act on that commitment.

A possible additional source of funding that could be diverted toward Stringfellow cleanup is the retroactive collection of hazardous waste disposal fees (especially for on-site disposal) that were due and payable to the Department from 1978 through 1981. It's my understanding that limited success to date has been made in collecting these past-due fees, which could total several million dollars.

Regardless of funding sources, the State should commit itself to raising funds for Stringfellow cleanup on an ongoing basis and should develop plans and specifications for phasing in a "post" interim abatement program in several discrete stages as money becomes available.

For example, one possible stage could be construction of extraction wells upstream of the site to remove clean groundwater for downstream discharge that would otherwise have infiltrated the site and generated additional contaminated leachate. Physical removal of waste materials could also be accomplished in discrete stages, as money becomes available, without significant disturbance of the rest of the site.

Please give serious consideration to the concerns and suggestions contained in this letter as you prepare to negotiate with the EPA over disbursement of Superfund money. We urge you to hold true to the commitment made by Governor

Tom Bailey

20 May 1982

citizens FOR A BETTER ENVIRONMENT

Brown and State agencies to a closure of the Stringfellow site that includes total removal of hazardous waste material as the only final solution to the toxic spectre of contamination that has threatened the health and well-being of citizens of the area for more than a decade.

Sincerely,

Michael E. Belliveau

Michael E. Belliveau
Research Associate

cc: Robert Stephens
Peter Rogers
Peter Weiner
Ken Finney
Penny Newman

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
SACRAMENTO, CA 95814
(916) 324-1793

June 16, 1982

Mr. Michael E. Belliveau
Research Associate
Citizens for a Better Environment
88 First Street, Suite 600
San Francisco, CA 94105

SUBJECT: STRINGFELLOW QUARRY HAZARDOUS WASTE DISPOSAL SITE

Dear Mr. Belliveau:

Thank you for your letter dated [illegible], 1982. I share many of your expressed concerns [illegible] evaluating the abatement program for [illegible] and the flushing and flow control measures. [illegible] further detailed analyses are as follows:

1. [illegible]

2. [illegible] recently developed additional grouting [illegible]

3. [illegible] be planned for the following locations:

   a. [illegible] contaminated area;

   b. [illegible] and potential contaminate levels;

   c. [illegible] potential migration through bedrock and any downstream contaminate levels.

4. [illegible] from the clay barrier for [illegible] to add reliability to the system.

5. Investigate the feasibility of locating and intercepting upstream springs for the purpose of [illegible]

Also, [illegible] clay barrier [illegible] The [illegible] material [illegible] layer with a [illegible] to [illegible] the protective [illegible]

Mr. Michael E. Dellinger

constant head of [illegible] inches of water. The final site grading will be such that rain waters will not collect and accumulate, therefore such penetration will not be possible. Finally, a maintenance program will be initiated to protect the cover from erosion and weathering.

Again, I appreciate your concerns and will strive to see that every effort is exhausted to put in place all controls required to secure this site and to protect the groundwater supply.

Sincerely,

Tyson E. Bailey, Acting Chief
[illegible]
[illegible]

cc: Mr. Dana B.
Chairman of [illegible]
[illegible]
[illegible]
[illegible]

Mr. [illegible] Finney
[illegible]
[illegible]
[illegible]
Sacramento, CA 9[illegible]

The Subcommittee of the House Committee
on Science and Technology, and the California
State Assembly Committee on
Consumer Protection of Toxic Materials

The job which we must address ourselves to is saving the community from further poisoning and immediately laying down plans for decontaminating the soil and water...
Parents of Jurupa, Inc.

To: Honurable George Brown
From: The Parents of Jurupa, Inc.

June, 1955..Proposal to locate industrial waste Stringfellow site.
"Since proposed site is underlaid by impermeable rock, operation will not constitute a hazard to waters of state if surface run-off is not allowed to carry waste into run off or drainage channel"..Edmonston, State Engineer.
"Provision must be made to assure if run-off occurs it does not run into ground waters of Chino Basin." Chino Basin provides drinking water for hundreds of thousands of people in the fastest growing counties in the United States: Riverside and San Bernardino Counties.

1960's..Parents of Jurupa used the definition: "Toxic means lethal, injurious to man and other living organisms, domestic animals and wildlife."
Parents of Jurupa received innuendos from Stringfellow lawyers that what they were saying was libelous and they should discontinue their protest.
"The Parents of Jurupa" then incorporated. The battle lines were drawn.

1972..Stringfellow pits were closed.

1973..Report by Neste, Bruden and Stone stated, "Exact nature of discharged toxic waste of load discharge unknown." "Once a class (of toxic wastes) was approved and accepted no further checks were made on that producer (company)."
The gate at Stringfellow pits was open 24 hours a day for all dumpers. Since there were no guards or locked gates the hauler left a written notice of the quantity of waste dumped at the office or in a locked box if he arrived after normal working hours. The dumping company was honor bound not to dump certain organics like DDT which the Montrose Chemical Company did dump, Children, domestic animals, wildlife roamed at will, in and around the pits.

1974..State Engineer Bob Fox was still saying,.."if it leaks, so what?"

Feb. 2, 1978..Parents of Jurupa, Inc. with the aid of Congressman Brown's office sent a sealed water sample from the pits to Colorado for analysis.[*1] This sample was found to contain at least 24 organic compounds such as Methylene chloride, Chloroform, trichloroethylene, etc. Findings were presented to California's Hazardous Materials Management in Feb. 1979. In a panic the California Hazardous Materials Management Section followed up with their own analysis which also pointed out rather sizeable amounts of DDT were present at the Stringfellow site.

1955-1983..Parents of Jurupa, Inc. given the run-around by James Anderson, Executive Director of Santa Ana Regional Water Control District, who, when told to test for certain organics in a letter from the State of California, Department of Water Resources, directed his workers not to perform certain of those tests. *2.

1978..Because of heavy rains at the site, James Anderson directed that 1,000,000 gallons of wastes be released into the community of Glen Avon. This was near the Glen Avon Elementary School which 670 students attended. This was done in complete disregard to what he knew about the poisons.

1978..Dr. James A. Hammond in a letter to Ruth Kirkby, Parents of Jurupa, Inc. stated, *3 "According to records I have seen, the exact composition of the materials dumped into the site was not know, although at least one carcinogenic material (hexavalent chromium) was reported to be present in measurable quantities. Aside from its carcinogenic nature, hexavalent chromium is also reported to be lethal to human when taken orally, as by drinking contaminated water."

March, 1983..Dr. Donald Stierman, Department of Earth Science, University of California, published his paper, "Stringfellow Fracture Study, Quantitative Contamination Analysis." "Chromium in cracks."*4 Chromium, a heavy metal, is a known carcinogen and was found down at a depth of 199 feet. His objective was to determine to what depths the fluids(wastes) had penetrated in the fractures in the granite. Professor Stierman is a national authority on granitic rock.

April, 1983..Parents of Jurupa, Inc. had water tested from the overflow into the community by Anachem Laboratories in Los Angeles, California, via atomic absorption spectroscopy which revealed an alarming array of heavy metals, some of which are involved in deactivating human enzymes systems causing brain disorders, epilepsy and birth defects in humans and wild animal populations. *5

April, 1983.. DE. Robert Stevens was pulled off the case by Governor Deukmajian and reassigned to another position. Other than the dedicated California Senator Robert Presley who has been most helpful to the Parents of Jurupa, Inc., Dr. Stevens was a driving positive force for the Parents of Jurupa, Inc.,and will be sorely missed .

Solutions

1. The Congressional Committee to direct the E.P.A. to allocate funds to legitimate leaders in the form of a trust so the state will not be able to divert these funds from their legitimate purpose for which they are intended.

2. A team effort for the resolution of decontamination procedures at or near the site will require much work by this team which will consist of geologists, hydrologists, chemists, engineers, citizens and ecologists.

3. Discontinue hauling toxic wastes from the Stringfellow site to Covina.

4. Fence off the entire canyon and post 24 hour guards.

5. The State should purchase all private land in the general area.

6. Draw up plans for a research station for on-site decontamination.

7. Fire Mr. James Anderson for being obviously derelict in his duty to protect the drinking water of the people of Glen Avon and in the future the larger population of Southern Californians who receive part of their drinking water from the Chino Basin.

Respectfully submitted,

Parents of Jurupa, Inc.

Cecil E. Johnson, Presentor
Associate Professor of Biology,
Riverside City College
Riverside, California

4.

Documents referred to in text:

*1 Laboratory Report, Hazardous Materials Laboratory, Division of Laboratories, Colorado Department of Health.

*2 Memorandum to California Regional Water Quality Control Board, Attention: Mr. James Anderson, Executive Officer, with notations on margins.

*3Letter to Ruth Kirkby, Secretary, Parents of Jurupa, Inc., from James A. Hammond, consulting chemist.

*4 Paper titled, Stringfellow Fracture Study, Quantitative Contamination Analysis, by Dr. Donald J. Stierman, Assistant Professor of Geophysics, Department of Earth Sciences, The University of California

*5 Analysis report to Patrick Wall from the Anachem Laboratories, testing the liquid sludge.

39-743 0 - 85 - 15

Every Test Done To Mine Alpha Beat
To Congress Bur
To Colorado
sent 1978 (10-13)
results Feb 1979

(*1)

--LABORATORY REPORT--

Hazardous Materials Laboratory
Division of Laboratories
COLORADO DEPARTMENT OF HEALTH

TO: William Dunnill FROM: C. E. Lotts Jr.

SUBJECT: GC MS Identification of Organic Compounds

INTRODUCTION--

On October 19, 1978 a sample of a dark liquid was submitted to the laboratory by Mr. W. S. Dunn for the identification of the organic compounds present therein. The sample was logged and assigned the log #78081. The sample consisted of a volume of approximately 8 ounces and was contained in a glass jar with what appeared to be a teflon liner in the cap.

SUMMARY

1. The oil was found to contain at least 24 purgeable organic compounds (volatiles).

2. These compounds identified by GC MS as being present in the sample were: METHYLENE CHLORIDE, CHLOROFORM, 1,2-DICHLORO ETHANE, TOLUENE, TETRACHLOROETHYLENE, CHLOROBENZENE, ETHYL-BENZENE, at least two isomers of XYLENE, CUMENE, at least two isomers of DICHLOROBENZENE, CYMENE, AND NAPHTHALENE.

3. There remain several unidentified organic compounds in the sample at very low levels of concentration.

4. The levels of the purgeable organics fell within the parts per billion ranges of less than 1 PPM to greater than 30 ppb.

5. Compounds of the higher concentration levels were TRI-CHLOROETHYLENE, CHLOROBENZENE, the XYLENE isomers and the two isomers of DICHLOROBENZENE.

6. Several unsuccessful attempts were made to extract the base neutral compounds and the acid extractables but the formation of both a flocculent precipitate and an emulsion prevented an adequate extraction to be made.

EXPERIMENTAL--

Volatile Compounds:

The 9 volatile compounds were purged from a 10 ml sample with a stream of helium (20 ml/min) onto a porous polymer trap. The trap (6 inches by 4 inches) was held at room temperature during the purge and trap operations (20 minutes). The trap was then attached to the mass spectrometer and heated to approximately 200 deg-C for 1 minute and the trapped compounds injected into the GC/MS. The GC/MS analytical column (SP-2100) was temperature programmed from 10-75 deg-C at 5 deg-C/min. The mass spectrum of each component was obtained as each eluted from the column.

The spectra collected were then compared both manually and by computer techniques with a reference library collection of more than 8,000 authentic spectra. Those compounds identified are given in the Summary.

Base-Neutral Compounds:

The sample was adjusted to pH 11. This adjustment resulted in the formation of a heavy flocculent precipitate. Attempts to extract the sample resulted in emulsions which were found to be very stable. No suitable means was found to break the emulsion.

Acid Extractable:

The sample was then adjusted to pH 2 and another extraction was attempted. The extract was concentrated and examined by GC/MS. No significant levels of organics were found.

DISCUSSION--

The analytical schemes used in this investigation are those proposed by the EPA. As the laboratory observations would suggest, the schemes for the extraction of the organics will require further laboratory evaluation and refinement for use on samples of this character. It should be pointed out that although there were no organics observed in the acid-extract, it is not the opinion of organics of this class cannot be shown due to the possible adsorption on the precipitate in the base-neutral operation.

State of California — The Resources Agency

Memorandum

To : California Regional Water Quality Control Board
Santa Ana Region
6809 Magnolia Avenue, Suite 14
Riverside, CA 92506

Attention: Mr. James W. Anderson
Executive Officer

Date : JAN 5 1973

File No.: [illegible]

Subject: Stringfellow Class I Disposal Site; Possible Monitoring Program

From : Department of Water Resources
Los Angeles, CA 90053

In accordance with Mr. Richard A. Boermann's telephone request of December 11, 1972, Mr. Sanford Werner, Associate Geochemist, inspected the subject site on December 14. He met Mr. Stringfellow there. They discussed possible monitoring points and the reported threats of ground water degradation from the disposal facilities. Possible degradation has been indicated in Well No. 1S/6W-16Q by the increase in NO_3 and TDS concentrations from 17 mg/l and [illegible] mg/l, respectively, in April 1966, to 300 mg/l and 1,065 mg/l, respectively, in December 4, 1972, and hexavalent chromium concentrations of 0.05 mg/l on October 4, 1972, and 0.07 mg/l on December 4, 1972. [illegible]

The investigation examined the geologic, hydrologic, and water quality conditions at the site in its memorandum of June [illegible], 1972 (attached).

Based on information obtained from that inspection and from our files, we suggest the following monitoring program for evaluating the quality of ground water near the Stringfellow waste discharge facilities:

1. Measure water levels and obtain chemical analyses, including ammonium ion (NH_4) and heavy metals for all available wells (about 5 wells) in "Pyrite Canyon" drainage, north of State Highway 60 (Mission Boulevard), and selected wells south of Highway 60.

2. Obtain complete chemical analyses of wastes in disposal ponds, including NH_4 and heavy metals.

3. Analyze wastes in disposal ponds for exotic toxic and hazardous wastes, which a review of disposal records indicates, have been discharged into the ponds.

4. Analyze downstream wells north of State Highway 60 for similar constituents found in analyses under Item 3, above.

5. Collect soil samples from shallow test holes of various depths in the wash, downgradient from the munitions facility and analyze them for at least NH_4 and NO_3 ions.

6. Collect soil samples from various depths around Stringfellow's Well No. 1S/6W-16Q to evaluate the possible influence of wastes leaking (at least NH_4 and NO_3 ions) into the well. (A corral is near that well.)

JAN 8 1973

SANTA ANA REGION

The levels of the organics found in the purge operation are valid only for the point in time that the sample was actually sampled for analysis. It is a well known attribute of organics at low levels in water to undergo changes in concentration due to losses through the sampling container adsorption on the container walls, etc. Therefore, it would be a reasonable assumption that the sample actually contained higher levels of organics at the point of field sampling than was observed in the laboratory. It was observed in the laboratory that upon each sample removal from the sample container, that the organic level had fallen significantly.

The mass spectra are available for review if desired.

C. E. Lott, Jr.
Public Health Chemist

This report prepared 11/6/78.

JAMES A. HAMMOND
Consulting Chemist
1010 PACIFIC ST.
REDLANDS CA. 92373
(714) 792-0591

#3

September 4, 1978

Mrs. Ruth Kirkby, Secretary
Parents of Jurupa, Inc.
7581 Granite Hill Drive
Riverside CA 92509

Subject: Toxic wastes from the Stringfellow Class I dumpsite.

Dear Mrs. Kirkby:

I have been interested in your group's efforts to have the Class I dumpsite above Glen Avon cleaned up for several years and have previously recommended a course of action for determining the extent of pollution of the basin below the site and for abatement/decontamination at the site and ground water below the site. The distribution of the contents of the dumpsite over the Pyrite Basin and Glen Avon during the Spring rains has greatly multiplied the problem. According to the records I have seen, the exact composition of the materials dumped into the site was not known, although at least one carcinogenic material (hexavalent chromium*) was reported to be present in measurable quantities.

Aside from its carcinogenic nature, hexavalent chromium is also reported to be lethal to humans when taken orally*, as by drinking contaminated water. I have taken the liberty of constructing a table showing the number of glasses of water a person would need to drink to get a lethal dose, or by extrapolation, a toxic dose, which I am including at the end of this letter. While it is improbably that a person could (or would) drink enough contaminated water at one time to exceed the low lethal dose at low contamination levels, in the 1000-2000 ppm range, a person could easily exceed the low toxic dose (extrapolated) limits. I think about 20 cups of liquid a day, mostly water, and it is not unusual to have 3-5 cups of coffee with a meal. The short term effects are listed as neoplastic - i.e. tumors may be produced.

In addition to chromium, I suspect that there are dresols and phenol present. (I should like a chemical analysis to determine this absolutely.) The reported low lethal doses and low toxic doses for phenol are 140mg/Kg. and 14 mg/Kg. body weight of a human when taken orally. This is 1/3 of the dose for hexavalent chromium, and the values in the table can be divided by 3 for water contaminated by phenol. The lethal dose for a

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* The Toxic Substances List, 1974 Edition, H.E. Christensen, T.O. Luginbyhl, Eds., U.S. Department of Health, Education and Welfare National Institute for Occupational Safety and Health, Rockville, Md.

baby is now within probability when the phenol concentration is above 2000 ppm. The lethal doses for the cresols are reported to be about ½ that for phenol.

Air-borne phenol and cresol vapors are also toxic. The U.S. Occupational Standards for phenol and cresol vapors in a time-weighted average (usually in an 8-hour work day) is 5 ppm. However, these vapors can be absorbed through the skin, and the additional exposure through the skin may be dangerous.

The preceding arguments are made to show that more immediately toxic materials than hexavalent chromium may be present in the overflow from the Stringfellow site. The effects of long-term, low level exposure may produce other as yet undefined problems. Therefore, until complete chemical analysis shows otherwise, the overflow material must be treated as the most dangerous case. In my opinion, no water in the basin should be consumed or dirt moved (dust spreading) until the hazard is determined to be less than the lower limits established by the EPA.

This brings up the next subject: determination of the extent of contamination. If I were responsible for determining the contamination present in the basin and the canyon, I would do the the following:

1. Determine the nature of the contaminants. A complete chemical analysis for all materials (major, minor and trace) present in the waste at the dumpsite and at several selected sites downstream. This latter would include core samples to bedrock and well water samples. These samples would be compared to samples taken from similar geological formations in the immediate, uncontaminated area.
2. Determine the boundaries (and concentration contours) of the contaminants from the site. This would require possibly hundreds of core samples (to bedrock).
3. Determine the effect of the contamination on the Pyrite Basin water - how long to leave, how high contamination levels get before abatement.
4. Recommend decontamination procedures. Soil may need to be replaced, possibly some materials could be removed and recovered, other materials may be neutralized or immobilized. The dumpsite may be emptied and decontaminated. Any useful action must be based upon a knowledge of the exact nature and extent of the problem.

I hope that the foregoing may help you to come to a solution of the problem that exists because of the Spring floods and run-off from the Stringfellow site. I shall be pleased to aid in the solution of the problem in any manner within my capability.

Sincerely,

James A. Hammond

STRINGFELLOW FRACTURE STUDY

QUANTITATIVE CONTAMINATION ANALYSIS

MARCH 1, 1983

Fractures in the crystalline rocks underlying the Stringfellow site have allowed materials disposed of in lagoons between 1955 and 1970 to diffuse at least 150 feet deep into the granitic bedrock. Although the hydrology of fracture-dominated aquifers remains a complex problem, analysis of material in and adjacent to fractures found in the rock cores collected in February, 1981, may provide a basis upon which depth of penetration under the entire site might be evaluated. Results of 42 samples collected from fractures in the bedrock are given below.

Sample Selection and Preparation

Core logs prepared by the drilling team document a wide variety of conditions in the boreholes. Bedrock grades from highly weathered to completely unweathered granite, with some dikes and inclusions of other rock types present. While fracturing decreases with depth, evidence of cracks and alteration (alteration infers some circulation of water during the geologic history of the rock) was found to depths of 199 feet. My objective was to seek clues regarding the depth to which fluids from the site have penetrated the fractures.

With permission of the State Health Department, I visited the site on February 17. I inspected core samples from 6 boreholes, selected a suite of fractures exhibiting various apertures and mineralogy, and collected about 5 - 10 grams of material from each of 42 fractures. Control samples were selected from the granitic rocks of my research collection.

Preliminary tests had shown that a weakly acid solution extracted

8 oz. glasses of water to produce effect

Chromium conc. in water, ppm	Low lethal dose					Low toxic dose				
	Baby 11 lbs.	3 yrs. 30 lb.	8–9 yr. 55 lbs.	Adult 110 lb	Adult 220 lb.	Baby 11 lb.	3 yrs. 30 lb.	8–9 yr. 55 lbs.	Adult 110 lb.	Adult 220 lb.
100	100	280	500	1000	2000	10	28	50	100	200
1,000	10	28	50	100	200	1	3	5	10	20
2,000	5	14	25	50	100	½	1½	2½	5	10
10,000	1	3	5	10	20	22Tbsp	1/3	½	1	2

Table based on NIOSH data showing the low lethal dose for humans by oral ingestion is approximately 430 mg chromium compound per kilogram (2.2 lbs.) of body weight. The low toxic dose for many substances appears to be about 1/10 the lethal dose, so this has been assumed for the table. One 8 oz. glassof water contains about 227 g. of water and at 100 parts per million (ppm), each glass would contain about 23 mg. chromium.

chromium, an exotic element characteristic of the fluid waste, more efficiently than distilled water. A 0.14 N nitric acid solution was used to extract soluble components from the 42 borehole samples and 2 controls.

New test tubes were rinsed with double distilled water and allowed to dry. The tubes were weighted first empty (with stopper). Then, a split (2 to 5 grams) of the sample was placed in the test tube and the unit reweighed. Third, approximately 5 ml of 0.14 N nitric acid as introduced to the tube and the unit weighed once more.

The samples sat for about 72 hours, with moderate agitation at irregular intervals to encourage remixing of the experimental material. The mixtures were filtered and the leachate samples delivered to atomic absorption spectrophotometer (AAS) technician Jerry Ervin for analysis.

In addition to the control samples mentioned above, blank samples consisting of extraction fluids were also placed in tubes, agitated and filtered. None of the blanks contained signifiant detectable chromium.

Concentrations of chromium measured by the AAS were normalized with respect to total fluid used to extract soluble components and with respect to the total mass of the rock in each experimental unit. Table I summarizes the results.

DISCUSSION

The amount of chromium given in Table I is far less than the bulk concentration of the rock formation. My samples were taken from the fractures, from that part of the rock most susceptable to contamination. These fractures comprise, at most, a few per cent of the total rock formation. Some shallow fractures contained virtually no chromium, which shows that some fractures are not connected with the fracture systems that reach the surface. Figure 1 displays the pattern of chromium extracted as a function of depth. An optimistic interpretation might

place the bottom of the contamination, based on the available information, at about 85 feet. However, chromium extraction exceeded 1 ppm to depths of almost 150 feet. A conservative interpretation (conservative with respect to erring on the side of risking misidentification of uncontaminated material rather than erring by failure to detect contamination where it exists), based on the evidence available, finds measurable contamination blending into background levels of extractable chromium at 150 feet under the site. Suspect material was found in fractures 100 feet or more deep in 4 of the boreholes, suggesting that these fractures are pervasive in these rocks.

Some questions remain unanswered. First, my control samples were granite rather than alteration materials from fractures. I intend to test new control samples whose mineralogy more closely matches the clay minerals selected from the Stringfellow samples for extractable chromium. I will also have the mineralogy of the samples already tested determined so as to investigate possibilities of preferential absorption/release of chromium by different minerals.

I do not have drilling logs for boreholes B-5a or B-6. If anyone reading this report knows where I can obtain copies of these logs, I would appreciate their informing me.

Donald J. Stierman

Assistant Professor of Geophysics

Department of Earth Sciences

The University of California

Riverside, CA 92521

(714)-787-3438

Table I

SUMMARY, CHROMIUM EXTRACTED FROM FRACTURES
STRINGFELLOW CORE SAMPLES
MARCH 1, 1983
D.J. STIERMAN - THE UNIVERSITY OF CALIFORNIA (RIVERSIDE)

Borehole	Depth (feet)	Chromium extracted (ppm)
B-5a	61	0.141
B-6	151	0.0397
B-6	139	0.0403
B-6	133.5	0.0287
B-6	127	0.00796
B-6	104	0.0123
B-6	88	0.232
B-6	72	0.158
B-5a	122	0.0246
B-5a	115	0.228
B-5a	87	0.0329
B-5a	88	0.0294
B-5a	79	57.37
B-5a	77	1.59
B5-a	140	0.142
B-3	156	0.00858
B-3	134	1.09
B-3	93	0.0214
B-3	84	4.77
B-3	62	29.73
B-3	41	5.57
B-4	147	0.123
B-4	122	0.403
B-4	107	1.68
B-4	81	0.0835
B-4	65	166.37
B-4	59	99.33
B-4	41	42.65
B-2	117	0.838
B-2	105	1.92
B-2	99	0.0960
B-2	82	0.0197
B-2	70	0.569
B-2	66	286.04
B-2	199	0.376
B-2	189	0.140
B-2	180	0.274
B-1	142	0.0229
B-1	110 (different	0.166
B-1	110 (fractures)	0.273
B-1	107	0.824
B-1	78	8.042
Control #1		0.1308
Control #2		0.00989

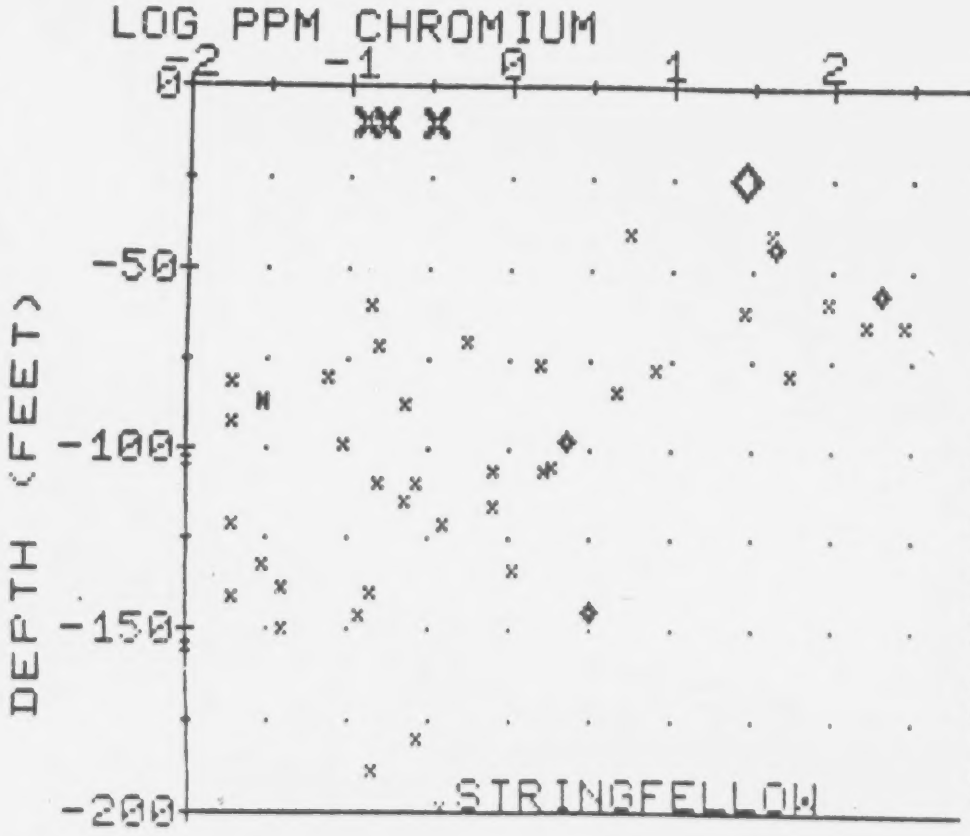

FIGURE 1

Concentration of chromium extracted from fracture fillings plotted as a function of depth. Horizontal axis values are plotted as logarithm (base 10) of mg chromium extracted per kg of sample.

Large "X" symbols show control values (measured for uncontaminated samples, including controls previously reported). One sample falls off the graph (<0.01 ppm).

Large diamond symbol shows chromium extracted from contaminated control, a rock collected from the bottom of a lagoon once filled with liquid waste.

Small diamonds show results of preliminary samples reported on previously.

Small "x" symbols show values measured in this phase of our study (new data).

#45

THE ANACHEM LABORATORIES

CHEMICAL - PHYSICAL - METALLURGICAL

17A WEST 20TH STREET LOS ANGELES, CALIFORNIA 90062 TELEPHONE (213) 294-1262 / 292-0586

PATRICK WALL

REPORT DATE Apr. 8, 1983
LAB NO. 260-03
YOUR ORDER NO.
SAMPLE (S) sludge
RECEIVED 3-29-83

LIQUID SLUDGE (OVERFLOW FROM ACID PITS)
Tested as received

METHOD: Known volume of the sample was digested repeatedly with con. HNO_3 and con H_2SO_4 mixture 3 times. The digest was cooled and filtered. The filtrate was restored to the original volume of the sample and then analyzed for the metals by atomic absorption spectroscopy. A separate volume of sample was analyzed for Total Cyanide.

			OSHA
Cyanide, Total	< 0.01	mg/L	
Aluminum, Total	3.83	g/L	
Arsenic, Total	0.02	mg/L	
Cadmium, Total	0.48	mg/L	0.01 mg/l
Chromium, Total	7.40	mg/L	0.05 mg/l.
Copper, Total	5.10	mg/L	1.0 " "
Iron, Total	6.60	g/L	0.3 " "
Nickel, Total	6.6	mg/L	
Lead, Total	0.20	mg/L	
Manganese	130	mg/L	
Mercury	< 0.002	mg/L	
Zinc	18.4	mg/L	5.0 mg/l.

over 14 times → O.S.H.A. STANDARD

I hereby certify that this report is correct to the best of my knowledge and belief.

Respectfully submitted,
THE ANACHEM LABORATORIES

V. G. Chaplo

... property of the Client. ... reserves the right to withhold ... publication of the data, conclusions or opinions therefrom